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ABSTRACT

This report of the New Jersey Department of Higher Education's Health Manpower Planning Contract describes project activities and assessment methods and models, presents data on employment supply and demand, and provides samples of questionnaires and forms that were used. The department was required under contract to: survey and evaluate pertinent data collection methods that have been used to collect information on non-licensed health professionals; develop and test survey instruments to collect employment and demographic data on non-licensed health professionals; survey and evaluate data collection methods to track graduates of health professions education programs; develop a methodology for tracking of health professions education program graduates; develop and implement a series of health manpower projections for New Jersey; develop a method for periodic assessment of health manpower projections; and coordinate its health manpower analysis activities with the State Health Planning and Development Agency and the State's five Health Systems Agencies. Additionally, the department conducted a detailed analysis of the future scope and cost of health professions education in New Jersey based on the results of the manpower projections and educational programming information. (SW)

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FINAL COMPREHENSIVE REPORT

The New Jersey Department of Higher Education's Health Manpower Planning Contract

(DHEW CONTRACT NUMBER 231-76-0015)

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
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HE 011 003

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August 21, 1978

FINAL REPORT HE

(DHEW CONTRACT NUMBER 231-76-0015)

N.J. DEPARTMENT OF HIGHER EDUCATION

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PREFACE

This report was prepared to meet the final reporting requirements of DHEW Contract Number 231-76-0015. During this two year contract, the following personnel were responsible for the successful completion of this contract:

Health Professions Education
  Edward Cohen, Assistant Chancellor
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Office for Health Manpower
New Jersey Department of Higher Education
Trenton, New Jersey
August, 1978

1. SUMMARY

Introduction

In 1973, a group of state and local planners from New Jersey began to address the technical aspects of health manpower planning in the State. These people represented various state agencies, collegiate institutions, local Comprehensive Health Planning agencies, and health care providers which were involved in the planning, preparation, or employment of health professionals. The group was convened to address the paucity of useful data specifically dealing with health manpower. Such data were needed to enhance the State's evolving capacity for health manpower planning and educational resource decision-making. To meet data needs, this interagency consortium developed a system for the collection of uniform data sets on licensed health professionals. This data collection activity began in August, 1973 and was completed by mid 1974.(1)

Once the survey was underway, the consortium started to address other areas of health professions education and planning. Its input and advice enabled the New Jersey Department of Higher Education to develop an unsolicited proposal for funding to create a statewide health manpower information system. A two year contract was eventually awarded "to develop a mechanism to link the resource allocation system with the health manpower planning and production systems".(2) In February, 1976, this contract was successfully completed. Subsequently, the Department sought another two year contract to establish additional quantitative techniques for health manpower planning and to continue in its capacity as a major participant in statewide health manpower planning activities. This contract was awarded in April, 1976. Since that time, the Department has developed data collection models to determine the distribution of non-licensed health professionals in New Jersey and the retention of health profession graduates in the State. In addition, it has continued to refine its capacity to coordinate the data, planning, and decision-making sectors of the health professions education system.

Health Professions Education Planning in New Jersey

In 1966, the New Jersey Legislature created the Board and Department of Higher Education. A major duty of the Board specified in the legislation is to "develop and maintain a comprehensive master plan which shall be long range in nature and be regularly revised and updated."(3) It was also empowered to

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(1) Dars, Lewis and Tomson, Jon, Development of A Uniform Data Base for State & Local Health Manpower Planning, New Jersey Department of Higher Education, Trenton, New Jersey, 1974.

(2) Negotiated Contract No1-MB-44001 for New Jersey Statewide Health Information System, 1973, p. 1.

(3) New Jersey Revised Statutes 18:21A-4b, Chapter 302, P.L. 1966.

"establish minimum standards for all public institutions of higher education for degree granting, and approve discontinuance of degrees and educational programs as required". (4) In meeting these responsibilities, the Board established master planning and program review capacities within the Department. Recognizing that health professions education programs were both uniquely specialized and of higher cost than most other collegiate programs, separate planning and coordinating activities for these programs were established.

In May, 1973, the Board approved the Health Professions Education Master Plan, a comprehensive plan which confronted issues of program development and approval, accredition, clinical training, professional credentialing, development of new professions, and manpower requirements for sixteen health professions in the State. The Master Plan also formulated an advisory network for its implementation and future revision. With the award of the first linkage contract, the Department was able to utilize its health professions education master planning advisory network as a key starting point in the development of an ongoing linkage network in New Jersey.

Health Manpower Planning and Linkages in New Jersey

The process of health manpower planning involves the determination of the future health care system; the translation of that future system into profession-specific demands; the projection of the state's ability to meet these demands under existing educational capacity; and the creation and implementation of health manpower development goals to meet projected manpower needs. Thus, health manpower planning is essentially a technical process the results of which are translated into guidelines for policy and decision-makers.

While the general process of health manpower planning is easy to comprehend, practical application of this process in a manner which is both methodologically appropriate and open to the numerous constituencies which are involved in the health professions is difficult to achieve. In 1974, a national survey of health manpower planning activities at the state level was released. The study specified the process of health manpower planning as one in which the planner gathers information on the stock of manpower resources and the health care providers' demand for health manpower; projects these resources and requirements; and analyzes the balance between resources and requirements as these relate to manpower supply, distribution, utilization, manpower development activities. (5) While this approach was similar to that first attempted by New Jersey in its 1973 Master Plan, the first linkage contract afforded us the opportunity to further systematize state level health manpower planning and decision-making.

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(4) Ibid, paragraph 4e.

(5) ABT Associates Inc. "Health Manpower Planning: A Survey of Alternative Approaches at the State Level", Cambridge, Massachusetts, 1974, p. 11-12.

In New Jersey, a unique situation existed in which health manpower planning was centered within the Department of Higher Education, as was the decision-making for health professions education resource allocations. However, in recognition of the passage of P.L. 93-641, the need for development of a health manpower data and analysis capacity within the State Health Planning and Development Agency and the local planning agencies was evident. During the earlier linkage project, these agencies were brought directly into the process of linkage development through the forum of the Interagency Advisory Committee on Health Manpower. The goal of this multiconstituent group was to provide health manpower data as an accurate and accessible resource for policy and decision-makers. This goal was to be accomplished by the establishment of a permanent central source within the state government responsible for the collection and processing of health manpower data and the dissemination of health manpower information. In its two year existence, this committee released a series of seven reports on health manpower in New Jersey. It also guided the Department in meeting the charges of its federal contract. Once this linkage contract was completed, the linkage strategy group (Interagency Committee) and its data collection responsibilities were shifted to the State Agency. The collection of health manpower data has been an ongoing process at that agency since that time. Moreover, the advisory committee has been reconstituted to serve the State Agency in its development of a Comprehensive Health Statistics System not only for the CHSS manpower component, but for the vital statistics, facilities and patient abstracts components as well.

In completing the linkage contract, it was evident that a number of health manpower areas still demanded attention in New Jersey. The non-licensed health professions, for one, were left unaddressed in the CHSS manpower compoent. That is, no valid method for the collection of data on these health professionals was available. Also, a method for the tracking of graduates of New Jersey's health professions education programs was needed. Finally, no comprehensive set of future manpower requirements in New Jersey had been developed using the newly collected manpower data. In order to meet these needs, the Department submitted an unsolicited proposal to support the further development of New Jersey's health manpower information, planning and educational system. This proposal was eventually accepted by the Office of Special Programs, Bureau of Health Resources, Department of Health, Education and Welfare, which provided New Jersey a two year contract to enhance its health manpower planning capacity.

Project Tasks

The health manpower contract specified a series of tasks to be accomplished over the two year project period. The Department was required to:

1. Survey and evaluate pertinent data collection methods which have been used to collect information on non-licensed health professionals.
2. Develop and test survey instruments to collect employment and demographic data on non-licensed health professionals
3. Survey and evaluate data collection methods to track graduates of health professions education programs.
4. Develop a methodology for tracking of health professions education program graduates.
5. Develop and implement a series of health manpower projections for New Jersey.
6. Develop a method for periodic assessment of health manpower projections.
7. Coordinate its health manpower analysis activities with the State Health Planning and Development Agency and the State's five Health Systems Agencies.
8. Continue its involvement with the health manpower data collection and analysis.

Accomplishments

Over the two year project, project staff was able to successfully complete most of the tasks specified in the contract. In addition, another activity related to health manpower planning, but not required in the contract, was undertaken during the project period. This was a detailed analysis of the future scope and cost of health professions education in New Jersey based on the results of our manpower projections and educational programming information. Listed below are the major accomplishments of the project during the two year contract:

1. Created a basic methodology for the determination of the size and distribution of the non-licensed health professions workforce premised on currently available data sources.
2. Designed a survey instrument and methodology to collect employment data on non-licensed health professionals.
3. Designed a survey questionnaire to collect uniform demographic data on thirty-one health professions.
4. Developed a survey instrument and data collection method to track graduates of health professions education programs.
5. Developed manpower projections of future supply and demand for twenty-eight health professions in New Jersey.

6. Developed documentation and strategy lines for implementation of these projections.

7. Created an extensive analysis of the impact of federal health manpower legislation (P.L. 94-484) on the future need for physicians in New Jersey.

8. Developed protocols and plans for continuous provision of manpower, population and economic data for assessment of the manpower projections.

9. Developed a plan for the efficient update of the educational program and clinical resource inventory.

10. Began the development of a method to rework the health manpower projections to HSA configurations.

11. Provided continuing technical assistance to HSA's for manpower planning activities, including the development of designation requests for health manpower shortage areas.

12. Achieved long range financial support for continuing health manpower planning initiatives within the Department of Higher Education.

13. Developed an extensive study of the future scope and cost of health professions education programs in New Jersey as such relate to comparative activities in other states, as well as how these costs compare to total expenditures for higher education.

Conclusion

With the completion of this second linkage contract, New Jersey has been able to enhance its ability for health manpower planning and coordination. Within the Department of Higher Education, there is a standing advisory committee concerned with health professions education program planning, and approval. The Department has also worked closely with the Department of Health (State Agency) to ensure their continuing commitment to the collection and dissemination of health manpower data to all users. This project has enabled the Department to create a series of health manpower projections and studies to guide it and its advisory bodies in future planning and resource allocation decisions. We are, therefore, beginning to move forward on new fronts, such as developing a coordinated system for graduate medical education; determining local manpower needs for physicians by specialty; studying the manpower needs for entry level health workers who could be trained in CETA programs; and, determining manpower needs for the State's changing mental health delivery system. The Department has established permanent lines to enable the retention of staff and a decrease in our dependence on grants and contracts for health manpower planning efforts. Accordingly, we are looking forward to completing the above noted projects and maintaining a strong capacity to meet new challenges in the health manpower planning area.

A. TASK 1: Develop, Conduct and Document a Methodology for Collection of Data on Non-licensed Health Manpower

1. STATUS OF THE TASK

The development of a model for the collection of health manpower data on non-licensed health professionals was an ongoing task throughout the project period. From the outset, this task was envisioned as one which should be easily translated for use in other states. It was developed with a recognition that potential using agencies have varying resources available to commit to primary data collection. Accordingly, the model developed allows for the accumulation of health manpower data from existing sources as well as the actual collection of health manpower data at varying levels of resource commitment. Each of the sub-tasks of this project task was successfully completed. Additional information on these sub-tasks can be found in the Nine Month Progress Report and the Twenty-One Month Report.

In order to determine the applicability of data collection methods which have been or are being used in the United States for non-licensed health manpower, a survey of every state health planning and development agency and all linkage projects in the nation was undertaken. We were unable to find a generally applicable method from the information gained from this survey. In fact, we found that few states were involved in the organized collection of data on non-licensed health professionals. The most useful methods used were coordinated by NCHS and BLS. These methods are presented in the general model narrative. The task narrative below also provides the two survey instruments required in the contract. These questionnaires were reviewed and pretested using the Manpower Subcommittee of the Department of Health's Technical Advisory Committee on Health Data. Both questionnaires meet the requirements provided by the contract under sub-tasks (e) and (f) of Task 1. The methodology for administering this non-licensed health manpower model and its questionnaires is discussed in detail on the following pages.

2. NON-LICENSED HEALTH MANPOWER MODEL

a. Introduction

The creation of a sound data base on non-licensed, allied health professionals is often bypassed in health manpower planning efforts. This is a function of both the historic emphasis on the major health professions and the difficulty which exists in collecting hard data on non-licensed professionals. At both the state and federal levels, significent resources are being expanded to create longitudinal data sets on the major licensed professions including medicine, dentistry, nursing, optometry, and veterinary medicine. Most recently, these efforts have centered on the implementation of Cooperative Health Statistics System (CHSS) manpower components in several states. These planning efforts are important, however, the time is approaching rapidly when state and local agencies will need to

PROJECT ACTIVITIES

The New Jersey Department of Higher Education's
HEALTH MANPOWER PLANNING PROJECT

address the numerous occupations which support the major health professions. This need is emphasized by a movement towards leveling off educational support at the federal level for medicine and dentistry and by a continuing policy stressing cost containment in service delivery. In the future, we will have to determine the appropriate mix of assisting and ancillary personnel necessary to meet the demands of the evolving delivery system. The development of a data base on the current utilization of these professionals is the first step in this planning process.

This model will address thirty-one health professions. It does not attempt to cover all the allied professions for a number of reasons. Some allied health professions, such as dental hygienists, physician's assistants and public health sanitarians, are licensed in many states. Collection of data for these occupations can be accomplished during the license renewal process. Also, the occupational groups selected for the model are those for which specialized post-secondary training, either college-based or in-service is required. Another consideration is how these occupations fit into the delivery system. The professions selected are involved in either direct patient care or diagnostic and problem identification areas. Accordingly, the vast majority of the chosen occupations involve assisting, laboratory technology, and therapeutics. Finally, we wanted to include occupational groups which were studied in national manpower survey activities. Of the thirty-one professions selected, twenty-eight can be found in the 1976 and 1977 NCHS Surveys of Hospital Staff.

The thirty-one occupations, their respective Department of Labor Codes, and all major employment sites for the professions are provided in the following section. The service sectors to be covered in the model include administration, clinical laboratories, dental services, dietary services, medical records and communications, occupational therapy, and speech and hearing therapy. There are seventeen major employment sites identified for these non-licensed health professionals. These are:

Blood Banks
Colleges and Universities
Dentists' Offices
Dental Laboratories
Health Maintenance Organizations
Hospitals
Medical Laboratories
Neighborhood Health Centers
Non-profit Agencies
Nursing Homes
Outpatient Clinics
Pharmaceutical Firms
Physicians' Offices
Private Industry
Public Health Departments/Agencies
Rehabilitation Centers
School Districts

Explanation of each of these employment sites, as well as information as to how to identify individual sites in a state or local planning area will be discussed later.

A three level model is described herein. It is designed to allow for the aggregation of manpower data on non-licensed professions from existant sources, through minimal collection efforts, or through a comprehensive data collection effort. Therefore, an agency can choose that model which meets its resource availability. The remaining discussion of the non-licensed manpower model includes a glossary; a presentation of manpower data sources which are currently available in most states (model level 1); description of a data collection instrument to gain basic employment data on the non-licensed professions (model level 2); and, description of a survey questionnarie to gain uniform demographic information about individual professionals (model level 3).

b. Glossary

Table I, on the following four pages, provides a description of the thirty-one non-licensed health professions which are included in the model. These professions are aggregated by service sector. Nine service sectors are used for this breakout; these include: administration, clinical laboratories, dental services, dietary services, medical records and communications, occupational therapy, speech and hearing, and other services. The Department of Labor Code and major employment sites for each occupation are also provided in Table I. It should be noted that one major employment site for health planners has not been included in the breakout. That is profit-making agencies, such as consulting firms. These agencies are not included as it is not only difficult to locate firms involved in health planning consulting but also their activities usually cross state boundaries, which means that they can not be considered a manpower resource unique to a given jurisdictional area.

On the five pages following Table I, the definitions for each occupation included in the model are provided. The definitions were developed from a number of sources, which are cited in the glossary's first page. Each definition was developed for use in the employment survey described in this discussion. The definitions are functional in nature rather than education-specific. Educational requirements and certification information are also provided. As will be noted in discussion of the employment survey, it is useful to include a differentiation between certified and non-certified individuals in a given occupational category, especially when the data collection effort is to be focused on educational needs. Appropriate delineation of certification status will be shown on the model questionnaire.

Table I - Major Employment Sites for Selected Non-Licensed Health Occupations*

Service Sector	Occupation	Department of Labor Code	Employment Site
ADMINISTRATION	Health Planner		Colleges & Universities Health Maintenance Organizations Hospitals Neighborhood Health Centers Nonprofit Agencies Public Health Departments
CLINICAL LABORATORIES	Medical Technologist Medical Laboratory Technician Clinical Laboratory Assistant	078.281 078.- T 078.381	Blood Banks Colleges & Universities Health Maintenance Organizations Hospitals Medical Laboratories Neighborhood Health Centers Outpatient Clinics Pharmaceutical Firms Physicians' Offices Public Health Departments
	Cytotechnologist Histologic Technician	078.281 078.381	Colleges & Universities Health Maintenance Organizations Hospitals Medical Laboratories Neighborhood Health Centers Outpatient Clinics Pharmaceutical Firms Physicians' Offices Public Health Departments
	Blood Bank Technologist	078.281	Blood Banks Health Maintenance Organizations Hospitals Medical Laboratories Outpatient Clinics Public Health Departments

*Development from Health Resources Statistics, 1975, United States Dept. of Health Education & Welfare, 1976.

Table I - Major Employment Sites for Selected Non-Licensed Health Occupations (con't)

Service Sector	Occupation	Department of Labor Code	Employment Site
DENTAL SERVICES	Dental Assistant	079.378	Colleges & Universities Dentists' Offices Health Maintenance Organizations Hospitals Neighborhood Health Centers Outpatient Clinics Public Health Departments School Districts
	Dental Laboratory Technician	712.381	Dentists' Offices Dental Laboratories Health Maintenance Organizations Hospitals Neighborhood Health Centers Outpatient Clinics Public Health Departments
DIETARY SERVICES	Dietitian	077.168	Colleges & Universities Health Maintenance Organizations Hospitals Neighborhood Health Centers Nursing Homes Outpatient Clinics Public Health Departments Rehabilitation Centers
	Nutritionist	077.128	Colleges & Universities Health Maintenance Organizations Hospitals Neighborhood Health Clinics Outpatient Clinics Public Health Departments
MEDICAL RECORDS & COMMUNICATION	Medical Records Administrator (Registered Record Librarian) Medical Records Technician (Accredited Records Technician)	100.388 249.388	Health Maintenance Organizations Hospitals Neighborhood Health Centers Nursing Homes Outpatient Clinics Public Health Departments Rehabilitation Centers

Table I - Major Employment Sites for Selected Non-Licensed Health Occupations (con't)

Service Sector	Occupation	Department of Labor Code	Employment Site
MEDICAL RECORDS & COMMUNICATION (cont'd)	Medical Librarian	100.168	Colleges & Universities Hospitals Public Health Departments
	Health Educator (Including School Health Educators & Public Health Educators)		Colleges & Universities Health Maintenance Organizations Hospitals Neighborhood Health Centers Outpatient Clinics Public Health Departments School Districts
OCCUPATIONAL THERAPY	Occupational Therapist Arts Therapist Music Therapist Recreational Therapist Occupational Therapy Assistant	079.128 079.128 079.128 079.128 079.368	Colleges & Universities Health Maintenance Organizations Hospitals Neighborhood Health Centers Nursing Homes Outpatient Clinics Rehabilitation Centers
SPEECH & HEARING	Speech Pathologist Audiologist	107.108 079.108	Colleges & Universities Health Maintenance Organizations Hospitals Neighborhood Health Centers Nursing Homes Outpatient Clinics Private Industry Public Health Departments School Districts
OTHER	Electroencephalograph Technician (EEG) Electrocardiograph Technician (EKG)	078.368 078.368	Health Maintenance Organizations Hospitals Neighborhood Health Centers Outpatient Clinics Physicians' Offices
	Respiratory Therapist Respiratory Therapist Technician	079.368 079.368	Colleges & Universities Health Maintenance Organizations

Table I - Major Employment Sites for Selected Non-Licensed Health Occupations (con't)

Service Sector	Occupation	Department of Labor Code	Employment Site
OTHER (cont'd)	Respiratory Therapist (cont'd)		Hospitals Neighborhood Health Centers Nursing Homes Outpatient Clinics Physicians' Offices Rehabilitation Centers
	Nuclear Medicine Technologist	078.381	Hospitals Medical Laboratories Outpatient Clinics Physicians' Offices
	Radiologic Technologist	078.368	Dentists' Offices Health Maintenance Organizations Hospitals Neighborhood Health Centers Nursing Homes Outpatient Clinics Physicians' Offices Public Health Departments Rehabilitation Centers
	Operating Room Technician	078.378	Hospitals Physicians' Offices
	Medical Social Worker	195.108	Health Maintenance Organizations Hospitals Neighborhood Health Centers Outpatient Clinics Public Health Departments Rehabilitation Centers

Non-Licensed Health Occupations Glossary[1]

ADMINISTRATION

Health Planner - determines the health care needs of a state or local area using planning techniques including analysis of census data, vital statistics, and health care utilization data, and the design and implementation of survey documents; and creates planning strategies to meet these needs with appropriate input from the consuming and providing sectors.

education: Master level.
certification: None.

CLINICAL LABORATORY

Medical Technologist - performs clinical, microscopic and bacteriologic tests and specialized procedures for use in the diagnosis and effective treatment of disease. Makes independent and correlative judgments and may supervise and/or teach laboratory personnel.

education: A four-year, bachelor's degree including a twelve month structured, American Medical Association approved medical technology clinical internship.
certification: Awarded by the American Society of Clinical Pathologists or the American Medical Technologists Registry (M.T.)

Medical Laboratory Technician - works under the supervision of a medical technologist, physician or scientist performing specialized bacteriological, biological, and chemical tests, requiring limited independent judgment, to provide data for use in the diagnosis and effective treatment of disease.

education: A two-year, associate level degree, with laboratory training.
certification: Awarded by the American Society of Clinical Pathologists (M.L.T.) or the American Medical Technologists (M.L.T.)

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[1] Definitions provided were developed from a number of publications including Job Descriptions and Organizational Analysis for Hospitals and Related Health Services (U.S. Department of Labor, 1971); Dictionary of Occupational Titles, 1965, Volume 1: Definitions of Titles (U.S. Department of Health, Education, and Welfare, 1976); Health Manpower Linkage Project Final Report (University of Arizona, 1976); Profiles of Seven Allied Health Professions - State of Illinois 1974 (Illinois Board of Higher Education, 1975); Survey of Selected Allied Health Manpower (Iowa State Department of Health, 1975); and, An Inventory of Health Professions Education Programs in New Jersey (New Jersey Department of Higher Education, 1975).

Clinical Laboratory Assistant - works under the direct supervision of a medical technologist, physician, or scientist performing laboratory procedures requiring basic technical skills and minimal independent judgment in chemistry, hematology and microbiology.

education: High school diploma or its equivalent plus completion of a twelve month laboratory training course.
certification: Awarded by the American Society of Clinical Pathologists (C.L.A.) or the American Medical Technologists (C.T.).

Cytotechnologist - works under the supervision of a pathologist screening slides of body cell samplings in search of abnormalities that are the warning signs of cancer.

education: At least two years of college education followed by a twelve month cytotechnology program.
certification: Awarded by the American Society of Clinical Pathologists (C.T.).

Histologic Technician - works under the supervision of a pathologist cutting and staining body tissue for microscopic examination.

education: A one-year structured, hospital-based program or a structured element of a two year associate degree program.
certification: Awarded by the American Society of Clinical Pathologists (H.T.).

Blood Bank Technologist - as a specialist in medical technology, performs both routine and specialized tests in blood bank immunohematology.

education: Structured program open only to certified medical technologists or certain baccalaureate program graduates.
certification: Awarded by the American Society of Clinical Pathologists (B.B.).

DENTAL SERVICES

Dental Assistant - assists the dentist in providing patient services. This may include patient preparation, chairside assistance, and dental x-ray procedures.

education: A one-year, post-secondary program (diploma or certificate) or a two-year associate level program.
certification: Awarded by the American Dental Assistants Association.

Dental Laboratory Technician - makes and repairs dental restorations such as dentures, crowns, bridges and inlays, under the direction or according to the prescription of a dentist.

education: A one-year post-secondary certificate program, two-year associate degree program, or five-year apprenticeship.
certification: Awarded by the American Dental Association.

DIETARY SERVICES

Dietitian - provides nuitrition care, counseling, and guidance to patients and other individuals, may be active in administration of food service programs, nutrition therapy, education or research.

education: A bachelor's degree plus completion of an American Dietetic Association approved nine-month internship.
certification: Awarded by the American Dietetic Association (R.D.).

Nutritionist - organizes, plans, and conducts programs using food and nutrient information for the solution of food problems, control of disease and promotion of health, may specialize in public health, research, or teaching.

education: A graduate degree in nutrition required.
certification: None required, often member of the American Public Health Association or the American Dietetic Association.

MEDICAL RECORDS AND COMMUNICATION

Medical Records Administrator - plans, develops, and manages systems of patient information, administrative and clinical statistical data, and patient medical records.

education: A four-year baccalaureate program.
certification: Awarded by the American Medical Record Association (R.R.A., formerly R.R.L.).

Medical Records Technician - assists the medical records administrator in coding, analyzing and maintaining medical records, reports, disease indices and statistics in health care institutions.

education: A two-year, associate degree program.
certification: Awarded by the American Medical Records Association (A.R.T.).

Medical Librarian - administers and maintains a hospital library containing medical books, reports, journals, and bibliographic tools for use of physicians, staff, and students.

education: At least a four-year bachelor's degree.
certification: Awarded by the Medical Library Association.

Health Educator - provides learning experiences which favorably influence understanding, attitudes, and conduct in regard to individual and community health.

education: At least a four-year bachelor's degree in health education.
certification: None at present.

OCCUPATIONAL THERAPY

Occupational Therapist - evaluates the self-care, work and leisure time performance skills of well and disabled clients and plans and implements programs and interpersonal activities to restore or maintain these skills.

education: A four-year bachelor's program in occupational therapy.
certification: Awarded by the American Occupational Therapy Association (O.T.R.).

Art Therapist - instructs patients in medically prescribed manual arts activities to prevent deconditioning and to assist in maintaining or improving work skills, within the limits of patients' abilities or disabilities.

education: A four-year bachelor's degree.
certification: None required, may be certified O.T.R. by the American Occupational Therapy Association.

Music Therapist - plans, organizes, and directs medically prescribed musical activities intended to improve or change patients' mental outlook to assist in their rehabilitation.

education: A four-year bachelor's degree in music therapy.
certification: Awarded by the National Association for Music Therapy (R.M.T.)

Recreational Therapist - plans, organizes, and directs recreation programs for patients and other special groups to effect improvement in their physical, mental, and social well-being.

education: A four-year bachelor's degree in recreation therapy.
certification: May register with the National Therapeutic Recreation Society.

Occupational Therapy Assistant - works under the supervision of the occupational therapist in evaluating clients and planning and implementing therapeutic programs.

Education: A one year post-secondary certificate program or a two year associate degree program in occupational therapy assisting.

Certification: Awarded by the American Occupational Therapy Association.

SPEECH AND HEARING

Speech Pathologist - diagnoses speech and language disorders and plans, directs, or conducts remedial programs to restore or improve communicative efficiency.

education: Graduate degree in speech pathology and audiology.
certification: Awarded by the American Speech and Hearing Association.

Audiologist - specializes in diagnostic, habilitative and rehabilitative services and research related to hearing, such as auditory training and lip reading.

education: Graduate level degree in speech pathology and audiology.
certification: Awarded by the American Speech and Hearing Association.

OTHER SERVICES

Electroencephalograph (EEG) Technician - adjusts, maintains and uses an EEG machine to graphically display impulse frequencies and electrical potential between portions of the brain for use by a physician in diagnosing brain disorders.

education: Six to twelve month in-service training with approved educational component.
certification: Awarded by the American Society of Electroencephalographic Technologists for graduates of twelve month programs.

Electrocardiograph (EKG) Technician - records electromotive variations in the action of the heart muscle, using an EKG machine, to provide data for diagnosis of heart ailments.

education: Up to six months of on-the-job training under the supervision of an experienced technician or cardiologist.
certification: None.

Respiratory Therapist - administers respiratory care under the direction of a physician, evaluating patients progress and making recommendations for respiratory therapy.

education: A two-year, associate degree with clinical training.
certification: Awarded by the American Association for Respiratory Therapists (R.R.T.).

Respiratory Therapy Technician - assists the respiratory therapist in routine treatment of patients requiring non-critical care.

education: A one-year, post-secondary program usually offered in hospitals.
certification: Awarded by the American Association for Respiratory Therapists (C.R.T.T.)

Nuclear Medicine Technologist - prepares radioactive isotopes for administration to patient; calibrates and operates radioscopic equipment to obtain information for use in the diagnosis of disease.

education: A twelve-month program for registered medical technologists and radiologic technologists.
certification: Can be awarded by the American Society of Clinical Pathologists (M.T.-N.M.T.)

Radiologic Technologist - maintains and safely uses equipment and supplies necessary to demonstrate portions of the human body on x-ray film or fluorscopic screen for diagnostic purposes.

education: A one to two-year program from a community college or hospital.
certification: Awarded by the American Registry of Radiologic Technologists (R.T.)

Operating Room Technician - functioning under the supervision of a registered nurse, assists in all operating room tasks, including patient preparation, operating procedures and proper clean-up.

education: A one year, approved post-secondary program.
certification: Awarded by the Association of Operating Room Technicians (C.O.R.T.)

Medical Social Worker - assists patients/clients and members of their families with personal and environmental difficulties which could prevent effective treatment of medical or health problems.

education: Minimum of a four-year bachelor degree in social work, masters degree preferred.
certification: Awarded by the National Association of Social Workers.

c. Existing Data Sources - Model Level One

There are three major sources of data available in most states which can provide useful information on non-licensed health professionals. These are the U.S. Department of Labor's triennial Survey of Occupational Employment, the National Center for Health Statistics' Survey of Hospital Staff, and surveys under the Cooperative Health Statistics System Health Facilities Component. The first two surveys can be used in conjunction with one another to roughly estimate the total non-licensed workforce at the state level. The Department of Labor survey can also be used with CHSS facilities surveys to estimate the approximate size of the non-licensed health professional workforce in a state. The CHSS Facilities Survey also will yield descriptive information applicable to the local planning area. Each of these surveys is described in the following discussion:

1. Department of Labor Occupational Employment Surveys

The U.S. Department of Labor, Bureau of Labor Statistics has been surveying manufacturing sites for a number of years. Recently, these survey activities have been greatly expanded to include numerous non-manufacturing industries, including health services. In 1975, most health service sites were surveyed using OES questionnaires. These sites are identified under the Standard Industrial Codes 801, 802, 803, 807 and 809. They include physicians', dentists', surgeons', osteopaths' and chiropractors' offices; medical and dental laboratories; and sanatoria, convalescent and rest homes, clinics and dispensaries not operated by hospitals, blood donor stations, birth control clinics, optometrists' and podiatrists' offices, group health associations, and trained and practical nursing services. An important exclusion from this survey activity was hospitals. They were not included so as not to be duplicative of NCHS survey activities. Copies of the three OES survey questionnaires used are provided in Appendix I.

The OES survey was undertaken in approximately forty states, with special sampling activities being run in those remaining states which did not have the full survey. Briefly, the full survey activity uses a sampling technique based on listings developed for unemployment compensation laws. Sampling is stratified by the size of a setting, as determined by the number of employees. Seven classes of setting size are used. Questionnaires are sent to all settings in the class covering the largest sites (i.e., all settings with over 100 people). As the number of employees diminishes, the proportion of settings sampled decreases. The last survey on the health service sector was run in mid-1975. These surveys are to be run on a three year cycle, therefore, the next survey of health settings should be made in mid-1978. Rather than attempting to coordinate the survey activity from its regional offices, the Bureau of Labor Statistics contracts the responsibility to the individual states. Accordingly, data collected for this survey can be solicited from the state's department of labor or economic security.

The OES survey results can be used to estimate the employment of non-licensed health professionals in a number of settings. However, these data are limited in their applicability to quantitative planning needs. First, data are available for the entire state only, thereby minimizing their importance to the local planner. Second, as evident in the survey questionnaires provided, there is no differentiation between full-time and part-time employees. This means that an estimate of full-time equivalents cannot be determined. Third, the respondent is not required to differentiate between employees who are certified in their profession and those who are not. For state level educational planning needs, it is important to know the mix of certified to non-certified professionals and observe any change over time. One final limitation in the survey is that there was no attempt to gain insight into additional demand for these occupational groups. At a minimum, this information could be gained by including a column on current budgeted vacancies for each profession.

2. The DHEW - NCHS Survey of Hospital Manpower In August, 1976, the National Center for Health Statistics initiated its Survey of Hospital Manpower, a data collection activity which was coordinated on a national basis. The survey sought information which would delineate all hospital staff from physicians to non-health workers such as bookkeepers and clerks. Well over forty non-licensed allied health professions were included in this survey. In addition, the questionnaire sought data on non-payroll staff and the utilization of inpatient nursing personnel. The survey format also included in separate glossary for each of the manpower categories. A copy of the questionnaire used in 1976 is in Appendix I.

The survey encountered a great deal of difficulty from the outset. Having been coordinated on a national scale, the survey was attempted without the benefit of a number of protocols which are important to the successful completion of any survey of hospitals in many states, including New Jersey. The lead time with which the survey documentation was sent to the state hospital associations was too short. Moreover, because many states routinely survey hospitals either through CHSS activities or independently, the survey was construed as being duplicative of other data collection activities. The comprehensiveness of the survey questionnaire, which requested data on well over seventy health occupations by credential status and an additional sixty non-health occupations, may have added to the problems which were encountered in getting a sufficient response rate. Limitations on on the quality of the results of this survey should exist when it is used for state level data analysis for most jurisdictions.

For 1977, a briefer version of the 1976 questionnaire was developed. The major limitations of this new version are that it does not differentiate between certification status within a profession and it does not reflect current demand for additional staff. However, since the survey is much simpler, not only for the inventory of occupations, but also for the sections on non-payroll personnel and inpatient nursing services, a higher response rate should be gained. A copy of this new version of the Survey of Hospital Staff is in the Appendix I. The results of the 1976 survey should be available in early 1978. Requests for data should be sent directly to the National Center.

3. Cooperative Health Statistics System Facilities Surveys

One of the four components to the Cooperative Health Statistics System (CHSS) is health facilities. As of October, 1977, twenty-six states and Puerto Rico had contracted with NCHS for health facility components. A core to this data collection activity is an inventory of full-time and part-time employees in each facility. Three classifications of facilities are included in this component, they are hospitals, long term care facilities, and other facilities, such as homes and schools for alcoholics, the deaf, the mentally retarded, and unwed mothers. As the staffing patterns for these facilities vary, the types of professions included in the survey are different for each facility category. In Table II, below, the professions included in each survey are shown.

As Table II indicates, both licensed and non-licensed health professionals are inventoried in this survey. Eleven of the non-licensed professions surveyed in this CHSS component are included in the model. For the professions shown in Table II, total number of full-time staff, total number of part-time staff hours are provided. One major limitation of this survey is that it lumps a number of professions together (i.e., other clinical laboratory personnel). It also does not differentiate by credential status within the professions. However, depending on the success of the state agency in achieving a high response rate, the results of this survey can be used to determine limited staffing patterns in many types of facilities within a state. As these data are coded to CHSS tape standards, data

Table II - Health Occupations Included in CHSS Facilities Surveys

Name of Profession	Survey Category of Facility		
	Hospital	Long Term Care	Other Facility
Administrations/Ass't. Administrators	X	X	X
Medical Interns and Residents	X		
Other Physicians	X	X	X
Dentists, Dental Interns/Residents	X	X	
Registered Nurses	X	X	X
Licensed Practical Nurses	X	X	X
Nursing Aides, Orderlies, Attendants	X	X	
Medical Records Administrators	X		
Licensed Pharmacists	X	X	
Pharmacy Technicians	X		
Medical Technologists	X		
Other Clinical Lab Personnel	X		
Dietition, Dietetic Technicians	X	X	X
Radiologic Technologists, Technicians	X		
Other Radiologic Personnel	X		
Occupational Therapists	X	X	X
Occupational Therapy Ass'ts./Aides	X	X	X
Physical Therapists	X	X	X
Physical Therapy Ass'ts./Aides	X	X	X
Recreation Therapists	X	X	X
Respiratory Therapists	X		
Medical Social Workers	X	X	X
All Other Health Mechanical Personnel	X	X	X
All Non-Health Professional and Non-Technical Personnel	X	X	X
Speech Pathologists/Audiologists			X

files can be accessed geographically to allow for local planning.

Another data collection activity currently being sponsored by the National Center's CHSS program is the Survey of Characteristics of Allied Health Manpower in Hospitals. This survey will be run on a national sample basis and will provide detailed educational, demographic, and employment profiles on a number of professions. This survey will include an actual visit to the selected hospital during which an employee sample will be drawn. Employees selected in the sample will be given questionnaries to complete and return by mail to the individual or agency responsible for the survey. The National Center announced that this survey activity may be domonstrated in a number of states during 1978.

The survey activities documented can provide a good starting point for estimating the size of the non-licensed health manpower workforce in a given jurisdiction. The main advantage of using these sources is that they can provide a reasonable baseline estimate of supply for no cost, without the collection of new data. However, any such estimate cannot be considered statistically exact as the reference date of the actual collection of data does vary from source to source. For those agencies which can afford to go beyond this type of data accoumulation and collect their own data, it is still useful to search out these data sources. As in the case with the Bureau of Labor Statistics' OES results, they can show what employment sites should be included for any given occupational category. Once any survey is completed, they also can be used as a yardstick against which survey results can be judged.

d. A Model Employment Survey - Model Level Two

The overriding principle of the health manpower linkage systems developed in a number of states, including New Jersey is coordination among planning, regulatory, and decision making agencies. Through such coordination, duplication of effort can be minimized and the costs of health manpower planning activities within an agency can be contained. In the process of developing a non-licensed health manpower data model, the possibility for duplication is an important concern. Therefore, prior to developing its own survey activity, an agency should explore all other data collection activities involving the professions and institutions to be studied. At a minimum, this should include the previously noted federally supported surveys. Other survey activities initiated at the state and local levels should also be explored. Once this process is completed, an employment survey such as the model presented here can be started, with appropriate deletions in the questionnaires reflecting those areas where data can be accumulated from an existing source.

The design of a questionnaire for an employment survey should include a cover letter detailing all pertinent information about the survey activity. At a minimum, the cover letter should explain:

1. The purpose of the survey.
2. The identity of the agency collectiong the information and their authority/responsibility for doing so.
3. Any endorsements of this survey by constituent groups such as a hospital association. An acknowledgment of other similar surveys which were consulted so as not to duplicate data requests.
4. The basic data being requested.
5. The intended uses for these data after they are collected.
6. Assurances as to confidentiality, intent to release only aggregate data, etc.
7. The date by which you would like to receive a response.
8. Who to contact for further information.

For the second wave of surveys which would be sent to non respondents, these general areas should be restated as briefly as possible, with an emphasis placed on the importance of the activity. This second letter should also convey that a reply has not been received and that either the initial survey or the response may have been mishandled or lost. It should also express your gratitude for the time and effort spent by the recipient in completing the survey. The third and final wave should have a briefer cover letter explaining your disappointment at not receiving a response to date. It should also indicate the response after the two waves (i.e., "thirty-four of our thirty-eight hospitals have already responded"). If the institutions being surveyed are represented by a state or local association, you should attempt to include a letter soliciting cooperation by the non respondent from the association.

The actual survey questionnaire should be designed to be as brief as possible. Ideally, a different questionnaire design should be sent to each type of employing institution, so that each occupation included will be relevant to the responding institution. Table III provides a matrix of those professions which should be included for each type of institution to be surveyed. For example, if a survey is to center on medical laboratories, the target non-licensed health professions to be inventoried would be medical technologists, medical lab technicians and assistants, cytotechnologists, histologic technicians, blood bank technologists, and nuclear medicine technologists. If the survey were to target a single profession, such as health educators, questionnaires would be sent to colleges and universities, health maintenance orgainzations, hospitals, neighborhood health centers, outpatient clinics, public health departments, and school districts. It should be noted that in many cases the institutional categories provided may employ only a small number of the chosen professionals. These sites are included to emphasize that they should be

Table III
Matrix of Occupations by Institution Type

Type of Institution

Occupation Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Health Planner		X			X	X		X	X						X		
Medical Technologist, Technician, Assistant	X	X			X	X	X	X			X	X	X		X		
Cytotechnologist and Histologic Technician		X			X	X	X	X									
Blood Bank Technologist	X				X	X	X				X				X		
Dental Assistant		X	X		X	X		X			X				X		X
Dental Lab Technician		X	X	X	X	X		X			X				X		
Dietition		X			X	X		X			X				X	X	
Nutritionist		X			X	X		X		X	X				X		
Medical Records Administrator Technician					X	X		X		X	X				X	X	
Health Educator		X			X	X		X			X				X		X
Occupational, Arts, Music, Recreational Therapist		X			X	X				X	X					X	
Speech Pathologist, Audiologist		X			X	X		X		X	X			X	X		X
EEG and EKG Technician					X	X		X			X		X				
Respiratory Therapist and Technician		X			X	X		X		X	X		X			X	
Nuclear Medicine Technologist						X	X				X		X				
Radiologic Technologist			X		X	X				X	X		X		X	X	
Operating Room Technician						X							X				
Medical Social Worker					X	X		X			X				X	X	

Institution Codes

1-Blood Banks
2-Colleges and Universities
3-Dentists Offices
4-Dental Laboratories
5-Health Maintenance Organizations
6-Hospitals
7-Medical Laboratories
8-Neighborhood Health Centers
9-Non-profit agencies
10-Nursing Homes
11-Outpatient Clinics
12-Pharmaceutical Firms
13-Physicians Offices
14-Private Industry
15-Public Health Departments
16-Rehabilitation Centers
17-School Districts

surveyed if one wishes to determine the universe of a given non-licensed profession. Frequently, the cost of attempting to survey all potential employment sites is prohibitive. In such cases, it may be more desirable to survey only the major employment sites such as hospitals, HMOs, outpatient clinics and public health departments to gain insight into 80-90% of an occupation's population. It may also be necessary to stratify an institutional category by size or types of service offered.

Table III and the glossary of occupations should be used as the framework for questionnaire design. If the matrix is followed precisely, seventeen different questionnaire formats would be needed. It is much simpler to design a number of surveys which would serve a span of employment sites. A large scale questionnaire should be developed for colleges and universities, health maintenance organizations, public health departments, hospitals, neighborhood health centers and outpatient clinics. A second format would be used for dentists' and physicians' offices, dental and medical laboratories, and pharmaceutical firms. Nursing homes and rehabilitation centers would be surveyed using a third questionnaire design. Finally, blood banks, school districts, private industry and non-profit agencies would each be given separate, one page survey questionnaires. For the purposes of this narrative, only the first survey questionnaire for colleges and universities etc. was designed and pretested. All other survey questionnaires should be designed using the same format, only the span of professions will be different for each. The model questionnaire and its covering letter can be found on the pages following Table III.

While the questionnaire format used in this discussion has been printed on regular paper, agencies expecting to run employment surveys should consider using pressure sensitive questionnaires. These will allow the respondent to keep a copy of the survey response for the record, in case the investigator calls requesting clarification on the response. The questionnaire should also provide for:

1. the identification of the responding institution by name, address and type of facility.
2. the identification of the person completing the questionnaire and to whom further inquiry might be made, including name, title, and phone number.
3. instructions for filling out form.
4. a definition of full-time status by number of hours worked per week.
5. a definition of positions being actively recruited for.
6. a concluding section for comments and requests for data reports once the survey is completed.

When the survey is designed, at least twice as many questionnaire forms as there are institutions to be surveyed should be printed. In order to estimate the number of institutions to be involved

Dear Hospital Administrator:

At this time, reliable data concerning non-licensed health professionals working in New Jersey are virtually nonexistent. In order to obtain meaningful data on the employment of such professionals, we are requesting your assistance in completing the enclosed survey questionnaire.

The New Jersey State Department of Higher Education, Office for Health Manpower has undertaken a project to develop a non-licensed health professionals survey to collect data on thirty-one allied health professions. This information will be used for local and statewide manpower and educational planning. This project is being funded through a grant provided by ------------------------.

As the attached letter(s) indicate, this survey has been endorsed by --------------------------. We would appreciate your assistance by completing the enclosed questionnaire. Every effort has been made to insure that this survey has statewide reliability and the support of all appropriate agencies.

In case you have any questions concerning the survey, a name and phone number has been provided on the first page of the questionnaire. An addressed envelope is enclosed for return of the completed questionnaire. We would appreciate return of the survey by -------------. Thank you for your cooperation.

Sincerely,

Lewis Dars, Ph.D.
Director
Office for Health Manpower

Enclosures

NEW JERSEY DEPARTMENT OF HIGHER EDUCATION
Office for Health Manpower
225 W. State Street, Trenton, New Jersey 08625
(609)292-8052

1978 - HOSPITAL SURVEY OF NON-LICENSED HEALTH PROFESSIONS

Name of Hospital: ____________________ Address: ____________________
Type of Hospital: ____________________ Number of Beds: ____________________
Person completing questionnaire
Name: ____________________ Title: ____________________
Telephone #: ____________________
Employment information for week ending: ____________

INSTRUCTIONS:

1. Please review the definitions provided for each occupation listed before you begin to complete this questionnaire.
2. Count each employee only once according to OCCUPATIONAL FUNCTION performed for the largest amount of time.
3. Full-time persons are those individuals working over 35 hours a week.
4. If you have any questions contact ____________________ at the above listed telephone number.

HEALTH OCCUPATIONS:

Report all employees on all shifts on the payroll of the last day of the payroll period specified above, regardless of whether they were at work on that particular day.

OCCUPATIONAL CATEGORY	FULL-TIME	PART-TIME	HOURS PART-TIME	# BUDGETED POSITIONS VACANT
ADMINISTRATION Health Planner - determines the health care needs of a selected population using planning techniques and creates planning strategies to meet these needs.				
→				
CLINICAL LABORATORY Medical Technologist - Performs clinical, microscopic and bacteriologic tests and specialized procedures for use in the diagnosis and effective treatment of disease. Makes independent and correlative judgements and may supervise and/or teach laboratory personnel.				
-Technologists, Certified MT, RMT →				
-Other Medical Technologists →				
Medical Laboratory Technician - under general supervision, performs specialized bacteriological, biological, and chemical tests, requiring limited independent judgment, to provide data for use in the diagnosis and effective treatment of disease.				
-Technologists, Certified MLT, RLT →				
-Other Medical Laboratory Technicians →				
Clinical Laboratory Assistant - under direct supervision, performs laboratory procedures requiring basic technical skills and minimal independent judgment in chemistry, hematology and microbiology.				
-Assistants, Certified CLA →				
-Other Laboratory Assistants →				
Cytotechnologist - under supervision of a pathologist screens slides of body cell samplings in search of abnormalities that are the warning signs of cancer.				
-Cytotechnologists, Certified CT →				
-Other Cytotechnologists →				
Histologic Technician - under supervision of a pathologist cuts and stains body tissue for microscopic examination.				
-Technicians, Certified HT →				
-Other Histologic Technicians →				
Blood Bank Technologist - as a specialist in medical technology, performs both routine and specialized tests in blood bank immunohematology.				
→				

OCCUPATIONAL CATEGORIES	PART-TIME	PART-TIME	HOURS PART-TIME	# BUDGETED POSITIONS VACANT
DENTAL SERVICES Dental Assistant - assists the dentist in providing patient services. This may include patient preparation, chairside assistance, and dental x-ray procedures.				
-Assistants, Certified CDA				
-Other Dental Assistants				
Dental Laboratory Technician - makes and repairs dental restorations such as dentures or inlays, according to the perscription of a dentist.				
-Technicians, Certified CDT				
-Other Dental Technicians				
DIETARY SERVICES Dietitian - provides nutrition care, counseling, and guidance to patients and other individuals, can administrate food service programs, nutrition therapy, education or research.				
-ADA Registered Dietitians				
-Other Dietitians				
Nutritionist - organizes, plans, and conducts programs using food and nutrient information for the solution of food problems, control of disease and promotion of health.				
MEDICAL RECORDS AND COMMUNICATION Medical Records Administrator - plans, develops, and manages systems of patient information, administrative and clinical statistical data, and medical records.				
-Administrators, Certified RRA				
-Other Medical Records Administrators				
Medical Records Technician - assists medical records administrator in coding, analyzing and maintaining medical records, reports, disease indices and statistics.				
-Technicians, Certified ART				
-Other Records Technicians				
Medical Librarian - administers and maintains a hospital library containing medical books, reports, journals, and bibliographic tools for use of staff.				
-ALA Certified Librarians				
-Other Medical Librarians				
Health Educator - Provides learning experiences which favorably influence understanding, attitudes, and conduct in regard to individual and community health.				
OCCUPATIONAL THERAPY Occupational Therapist - evaluates the self-care, work and leasure time performance skills of well and disabled clients and plans and implements programs and activities to restore or maintain these skills.				
-Therapists, Registered OTR				
-Other Occupational Therapists				
Occupational Therapy Assistant - works under the supervision of the occupational therapist in evaluating clients and implementing therapeutic programs.				
-Assistants, Certified COTA				
-Other Therapy Assistants				
Arts Therapist - instructs patients in medically prescribed manual arts activities to prevent deconditioning and to assist in maintaining or improving work skills, within the limits of patients' abilities or disabilities.				

OCCUPATIONAL CATEGORIES	PART-TIME	PART-TIME	HOURS PART-TIME	# BUDGETED POSITIONS VACANT
Music Therapist - plans, organizes, and directs medically prescribed musical activities intended to improve or change patients' mental outlook to assist in their rehabilitation.				
-NAMT Registered Therapists				
-Other Music Therapists				
Recreational Therapist - plans, organizes, and directs recreation programs for patients and other special groups to effect improvement in their physical, mental and social well-being.				
-NTRS Registered Therapists				
-Other Recreational Therapists				
SPEECH AND HEARING				
Speech Pathologist/Audiologist - diagnoses speech, language and/or hearing disorders and plans, directs, or conducts remedial programs to restore or improve communicative efficiency.				
-ASHA Certified Pathologists/Audiologists				
-Other Speech Pathologists/Audiologists				
OTHER SERVICES				
Electroencephalograph (EEG) Technician - adjusts, maintains and uses an EEG machine for physician diagnosis of brain disorders.				
Electrocardiograph (EKG) Technician - records electromotive variations in the action of the heart muscle, to provide data for diagnosis of heart ailments.				
Respiratory Therapist - administers respiratory care under the direction of a physician, evaluates patients' progress and makes recommendations for respiratory therapy.				
-Therapists, Registered ARRT				
-Other Respiratory Therapists				
Respiratory Therapy Technician - assists the respiratory therapist in routine treatment of patients requiring noncritical respiratory care.				
-Technicians, Registered CRTT				
-Other Respiratory Therapy Technicians				
Nuclear Medicine Technologist - prepares radioactive isotopes for administration to patient; calibrates and operates radioscopic equipment to obtain information for use in the diagnosis of disease.				
-Technologists, Certified NMT (ASCP)				
-Other Nuclear Medicine Technologists				
Radiologic Technologist/Technician - maintains and safely uses equipment to demonstrate portions of the human body on x-ray film or fluorscopic screen for diagnostic purposes.				
-Technologists, Registered RT				
-Other Radiologic Technologists/Technicians				
Operating Room Technician - functioning under the supervision of a professional nurse, assists in patient preparation, operating procedures and proper clean-up.				
-Technicians, Certified CORT				
-Other Operating Room Technicians				
Medical Social Worker - assists patients/clients and their families with personal and environmental difficulties which could prevent effective treatment.				
-Masters degree level Social Workers				
-Other Social Workers				

in the survey, each institution must be identified. Many of the institutions can be found through the state licensing authority, which is usually the state department of health. These should include Health Maintenance Organizations, Hospitals, Neighborhood Health Centers, Outpatient Clinics, Nursing Homes, Public Health Departments, and Rehabilitation Centers. In those cases where the state departments of health cannot provide the identifying information, local departments of health and HSAs may have the information. Also, third party payors, or state insurance agencies can be consulted to find those institutions which bill for midicaid and medicare services. The state department of labor or economic security can also be consulted to gain listings for SIC codes 801-807 for workman's compensation programs. Colleges and universities and school districts can be identified by state departments of education and county boards of education. Medical and dental laboratories often have licensed directos who also register with state departments of health. Otherwise, locating the state association for these facilities may be necessary. A quick telephone survey of practitioners can also be useful in identifying those laboratories serving a given area. Dentists' and physicians' offices can be identified through the state licensing authority, the use of CHSS manpower survey results, through state insurance departments handling malpractice insurance companies, or by consulting the rosters of state and local professional societies. Non-profit agencies can be identified most readily by conferring with local health officials. Pharmaceutical firms often have state associations, otherwise the state department of labor can be consulted for this information. Private industries are difficult to trace down and usually do not employ sufficient numbers of non-licensed health professionals to warrant surveying. However, identification can be attempted through state departments of labor or economic security.

To run a full scale employment survey across an entire state is a large undertaking. Therefore, SHPDAs should consider contracting the responsibility for these surveys to the local agency, which should find such data useful. The SHPDA could design the survey; identify all institutions to be surveyed by type and HSA area; print a sufficient number of questionnaires; mail the first wave of questionnaires out; and design a manual of instruction for follow-up, verification, the second and third mailing waves, and aggregation of responses. Responsibility for these activities would be given to each HSA within the state. The result of this type of arrangement would be the assurance that each HSA and the state would be using uniform data for manpower planning purposes. Such an approach might well be applied to other data collection activities, thereby fostering greater coordination among these agencies.

e. The Demographic Survey - Model Level Three

Once an employment survey has been completed, a planning agency can ascertain the size, distribution, credential status, and employment status of each non-licensed health profession in in the surveyed geographic area. It may be found that this kind of information is not sufficiently detailed to meet all planning needs, as the employment survey does not provide basic demographic data on any one professional group. Additional demographic data which an agency might wish to know include age, sex, ethnicity, education and training, type of professional responsibilities, and other socioeconomic characteristics. In order to gain this type of profile data, a separate survey questionnaire must be designed for distribution to individual professionals.

There are two alternative means to administering a demographic survey of non-licensed health professionals, either through their professional associations or their place of employment. A survey conducted through a professional association can provide a good data base on a segment of a professional group. Such a survey can be run directly through the auspices of the professional association using their letterhead and their mailing system for the survey. A survey of two waves is sufficient to gain an adequate response. In developing a questionnaire for such a survey, it should be anticipated that the governing body of the society may wish to include additional questions which are important to their needs. Thoughtful placement of such questions on the questionnaire should not adversely effect the outcome of the survey and may enhance its acceptability to the membership and the association's governing board. The most favorable circumstance to use the professional association for a demographic survey occurs when the vast majority of professionals in an occupation were found to be certified in their profession during the employment survey. However, it should be recognized that a proportion of these professionals may not belong to an association. As the percentage of certified workers in an occupation decreases, the usefulness of the survey of professional associations also decreases. There is also a good probability that the members of a professional association may be a unique subgroup of a profession's population. These people may be more apt to have a credential, to have a higher educational attainment than their co-workers, and, to be involved in continuing education programs. These possibilities should be addressed in any survey of a professional association which is expected to be representative of the entire professional workforce.

The second method to gain demographic information about a non-licensed health professional group is through surveys coordinated through their place of employment. Using the response gained from the employment survey it is possible to determine the distribution of professionals by size and type of institution for each occupational category. Using this type of breakout, it is possible to develop a stratified sampling plan which can be used to distribute the the proposed sample evenly across types and sizes of employing institution and geographic areas. Once the institutions to be sampled are identified, letters of intent should be sent to each, specifying the rationale and time requirements of the survey and requesting a brief interview with a member of the administrative staff to determine the best means to distribute the survey once the sample of health professionals has been drawn. During this interview, the interviewer should explain each occupational category to be included in the survey and seek listings of all employees in each of these categories. If listings are not available, the interviewer should determine a means to develop such lists through information provided by the administrator, department chiefs, etc. Once a listing is available, a routine sampling list of every nth employee can be developed. In those instances where five or less employees are found in an occupational category, a survey of each employee should be considered. All employees selected for surveying will be given a questionnaire to fill out and return by prepaid mail to the surveying agency. The listing of sampled employees should be retained as a master to be used as a guide for a second wave of surveys to be sent to non-respondents. Distribution of the questionnaires should be attempted using a coordinator who is an employee of the facility. The most feasible method to accomplish distribution is by having the coordinator give the questionnaire with a verbal explanation directly to the employee. If this is not possible, a good alternative is the use of the payroll distribution system. In such cases, it is helpful to have a short explanatory note included with the survey signed by the administrator.

The actual questionnaire design is an important consideration. If the survey is intended to be used on a periodic basis to study a smaple of the professionals over time, the questionnaire should include questions concerning name and mailing address. For one shot surveys, addresses should not be requested, though name or identifiers must be included for follow-up or verification procedures. The questions included in either type of survey should provide the following data:

1. job title
2. data of birth (day, month, year)
3. sex
4. race
5. ethnic background
6. location of birth
7. location of secondary education
8. types of degrees held
9. location of schools granting highest degree
10. professional status (registered or certified, registry eligible, no certification)
11. type and location of major employer (for professional association surveys only)
12. employment status
13. number of years employed as health professional in current field
14. type of occupational activity (by average weekly hours)

There are other questions which might be asked to further probe the educational and occupational backgrounds of the survey respondents, as well as to answer other research questions. The questions outlined above will provide a strong core to any manpower data base. As such, they have been used to create the model demographic survey which can be found on the next page.

f. Conclusion

The general methodology to be used in administering either of these two surveys was described in the discussion of each questionnaire. Briefly, any survey activity which is anticipated should first be described to any other constituencies which could find value in the data or may be undertaking similar data collection activities. At a minimum, this should include the SHPDA, HSAs, hospital and professional associations, state departments of higher education and labor, and licensure authorities. This communication should allow for greater coordination and cooperation in the data collection area. Other on-going survey activities regarding the employment of non-licensed health professionals should be analyzed including the BLS surveys, CHSS facility surveys and NCHS hospital staff surveys. Once these preliminary activities are completed, employment surveys can be undertaken. It is recommended that such surveys be coordinated through the HSAs by a contracting procedure. This will insure that each local agency will be using the same data base in the future and may also result in a higher response rate. Using the results of the employment survey, a sampling procedure for a demographic survey of non-licensed health professionals can be designed. If there are no employment survey data available, a demographic survey can be run through the professional associations. It is, however, more effective to sample the workplace. Sampling should be arranged through an interview procedure with the employer, rather than entirely through the mails. Once this survey is completed and its results aggregated, the agency should have a useful profile of its non-licensed health professionals to be used in conjunction with its labor force inventory for educational and manpower planning purposes.

Dear Health Professional:

The Office for Health Manpower of the New Jersey Department of Higher Education is sampling members of thirty-one allied health professions employed in various settings throughout New Jersey. The information from this survey will be used to assist the State in its educational and health manpower planning activities.

The attached questionnaire has been developed in a standardized form to be applicable to each profession. This is a statistical survey, and all data on the questionnaire will remain confidential.

We are asking you to complete the enclosed questionnaire and return it promptly in the envelope provided. This will only take a few minutes of your time and it will provide us with valuable information.

We appreciate your cooperation on this survey. If you have any questions about this questionnaire, please feel free to call us at (609)292-8052.

Sincerely,

Lewis Dars, Ph.D.
Director
Office for Health Manpower

Enclosures

NEW JERSEY DEPARTMENT OF HIGHER EDUCATION
Office for Health Manpower
225 W. State Street, Trenton, New Jersey 08625

1978 - Survey of Allied Health Professionals

1. Health Professions for which you received formal training: (check one)
   - ☐ Arts Therapist
   - ☐ Blood Bank Technologist
   - ☐ Clinical Lab. Assistant
   - ☐ Cytotechnologist
   - ☐ Dental Assistant
   - ☐ Dental Lab. Technician
   - ☐ Dietitian
   - ☐ Electrocardiograph Techn.
   - ☐ Electroencephalograph Techn.
   - ☐ Health Educator
   - ☐ Health Planner
   - ☐ Histologic Technician
   - ☐ Medical Lab. Technician
   - ☐ Medical Librarian
   - ☐ Medical Records Adminis.
   - ☐ Medical Records Technician
   - ☐ Medical Social Worker
   - ☐ Medical Technologist
   - ☐ Music Therapist
   - ☐ Nuclear Medicine Technol.
   - ☐ Nutritionist
   - ☐ Occupational Therapist
   - ☐ Occupational Therapy Asst.
   - ☐ Operating Room Technician
   - ☐ Radiologic Technologist
   - ☐ Recreational Therapist
   - ☐ Respiratory Therapist
   - ☐ Respiratory Therapy Techn.
   - ☐ Speech Pathologist/ Audiologist

2. Last Name: ______ First: ______ M.I. ______

4. Date of Birth: Mo.___Day___Yr.______

3. Home Address: (No. and Street) ______
(City, State, Zip Code) ______

5. Sex: ☐ Female ☐ Male

6. Location of Primary Employment: (Institution Name) ______
(No. and Street) ______
(City, County, Zip Code) ______

7. Setting for Primary Activity:
   - ☐ Hospital
   - ☐ Nursing Home
   - ☐ School
   - ☐ College/University
   - ☐ Public Health
   - ☐ Outpatient Clinic only
   - ☐ Practitioner's Office
   - ☐ Business/Industry
   - ☐ Dental or Medical Laboratory
   - ☐ Government
   - ☐ Other: (Specify) ______

8. Location of Birth: ☐ New Jersey ☐ Other: (Specify) ______

9. Where did you attend High School? ☐ New Jersey ☐ Other: (Specify) ______

10. What degrees do you hold: ☐ Certificate ☐ Associate ☐ Baccalaureate ☐ Doctorate ☐ Other: (Specify) ______

11. Name and location of school granting highest degree:
School ______ Location ______
State ______ Graduation Year: ______

12. Professional credential status: ☐ Registered ☐ Registry eligible ☐ Certified ☐ No Certification ☐ Other: (Specify) ______ Name ______ (e.g. MLT(ASCP)

13. Current Work Status: ☐ Full-Time ☐ Part-Time

14a. Number of years employed in current field: ______
b. Number of years at present place of employment: ______

15a. Total hours worked per week: ______
b. Hours worked per week in Primary Employment Setting:

	Hours		Hours
☐ Direct Patient Care	____	☐ Clerical Duties	____
☐ Administrative	____	☐ Research	____
☐ Teaching	____	☐ Other: (Specify) ______	____

16. Race:
   - ☐ White Caucasian
   - ☐ Black or Negro
   - ☐ Asian or Oriental
   - ☐ American Indian
   - ☐ Other: (Specify) ______

17. Ethnic Background: (if applicable)
   - ☐ Mexican American
   - ☐ Puerto Rican
   - ☐ Central or So. American
   - ☐ Cuban
   - ☐ Other Spanish: (Specify) ______

B. TASK 2: Develop and Document a Methodology for Tracking Graduates of Health Professions Education Programs

1. STATUS OF TASK 2

The development of a methodology for tracking graduates of health professions education programs was a task which was completed during the first half of the projection period. The end product described below was designed as a step by step "procedural manual" which could be used by state-level coordinating agencies or individual academic institutions to gather useful data on graduates of health professions programs.

In order to determine the applicability of data collection mechanisms which have been or are currently being used in the United States for tracking health professions program graduates, a survey of every state-level higher education coordinating agency, every state health planning and development agency, all linkage projects, many individual health professions schools and all New Jersey institutions of higher education was undertaken. We were unable to find a sound, generally applicable methodology for tracking health professions graduates. Although some state-level agencies and most academic institutions make some effort to collect post-graduation data on their graduates in general, few of these efforts were organized, ongoing activities, and none could be adopted in their entirety to meet this project's needs. However, portions of the survey procedures developed by a number of agencies and institutions have been adopted for use in this task and are fully documented within the task narrative.

Each of the sub-tasks of this project were completed, and the results are presented in the following task narrative. The survey instruments required by the contract were reviewed in conjunction with an extensive pre-test of a Departmental post-graduation survey of all graduates of New Jersey colleges and universities. The survey instruments (sub-task (b) and the implementation methodology (sub-task (f)) are discussed in detail on the following pages. The general methodology for storage and access of data (sub-task (e))is briefly discussed in the following narrative and documented in Appendix II of this report.

2. METHODOLOGY FOR TRACKING HEALTH PROFESSIONS GRADUATES

a. Introduction

For assessing the outcomes of educational efforts, one of the best sources of data available to colleges, universities and state-level coordinating and planning agencies is that which is provided by graduates. Post-graduation experiences and attitudes provide important indicators of the outcomes of educational preparation, the current marketability of various professional skills and the geographic and career mobility of graduates. The need for this information has become increasingly important in the area of health professions education as both the number of students entering health careers and the cost of educating health professionals have risen dramatically along with the increasing awareness on the part of state-level agencies of the need for health manpower planning.

The purpose of this task is to provide a technical guide for individual academic institutions and state-level agencies wishing to provide information on occupational and educational directions taken by graduates of various health professions programs at different degree levels. This guide suggests survey instruments and information systems procedures to facilitate the acquisition and analysis of these data on a recurring basis. Specifically this narrative includes: 1) a brief description of research questions that should be addressed; 2) a survey plan and draft instruments; 3) a plan for the administration (assembly and distribution) of the survey, including follow-up procedures; 4) suggestions for measuring non-response bias in the survey results; 5) a general methodology to process, house and access the survey data; 6) a brief discussion of strategies for the state-wide coordination of individual institutional tracking efforts in order to appropriately aggregate institutional data at a state level.

b. Establishing the Purpose of the Tracking Survey: Appropriate Research Questions

The first step to be taken is the delineation and clarification of the critical questions to be answered by the survey results. Once this initial step is accomplished, all of the remaining tasks in the survey process are "means to an end" and will follow logically from the purpose of the study identified in this step. Generally, the more objectives a study is to accomplish, the greater will be its complexity and cost. So it is important to set priorities as to the objectives that will be most important to achieve, given certain time and monetary constraints.

The draft surveys which are included in this guide have been designed to provide information that will focus on the research questions specified below.

Many of these questions do not pertain solely to the graduates of health professions education programs. They are core questions which should be included in any graduated student survey. These were culled from an examination of general graduated student surveys which have been conducted in New Jersey and in other states. The specialized questions pertaining only to health professions programs graduates could provide additional information useful to health manpower planners and to academic institutions wishing to evaluate the outcomes of individual health professions education programs. The individual researcher may eliminate questions or add others (and corresponding survey items) according to any constraints or differing priorities. However, these suggested questions solicit basic data on the employment status, career development, geographic mobility and educational development of graduates of health professions education programs.

Purpose of Study: To track the occupational and educational development and mobility of graduates of health professions programs and to gather indicators of the outcomes of educational programs through data provided by graduates.

Research Questions:

(1) Characteristics of Graduates

What are the characteristics that mark the graduates of each type of program at each degree level in terms of

- Sex?
- Race?
- Age?
- Past professional experience in major field of study?

(2) Educational Development

What percentage of graduates of various programs at various degree levels are pursuing further education for a more advanced degree?

Of those who are pursuing further education:

- Do they do so on a full-time or part-time basis?
- Where is their educational program located?

To what extent is this degree related to their previous field of study?

How do graduates evaluate the contribution of their former educational preparation to current educational activity?

(3) Occupational Development

(a) Employment Status

- What percentage of graduates are employed?
- Are they employed full-time or part-time?

- Of the graduates employed part-time, what percentage would prefer full-time employment?
- What percentage of graduates are neither employed nor in school and why?

(b) Geographic Mobility

- What percentage of graduates are employed in the State in which they received their degree?
- In what other states are graduates employed?
- Of those graduates of programs to train licensed health professionals, what percentage hold licenses in the state in which they received their degree, and what percentage hold licenses to practice in other states?

(c) Career Track

- What percentage of graduates in various fields and at various degree levels have been certified by an appropriate national professional certifying board or association?
- What percentage of graduates are working in their fields of preparation or a related field and how many are working out of their field and why?
- In what health care settings do employed graduates work?
- Of the graduates who are employed in their fields of preparation, or a related field how much work-time do they spend on various job activities (e.g., direct patient care, teaching)?
- To what degree are graduates satisfied with their current jobs? What percentage are employed in jobs with definite careeer potential?

(d) Program Evaluation

- To what degree are graduates satisfied with their academic programs?
- To what extent did the educational preparation received contribute to their career development?

c. Survey Plan and Prototype (Draft) Instruments

Once the purpose of the survey and the research questions to be answered have been defined, the plan of action for conducting the study must be developed. This plan must include clear definitions of the units of analysis under study and the appropriate survey design. If the researcher decides to perform a sample survey, decisions on the size and kind of sample must also be made.

(1) Units of Analysis

The units of analysis at which this methodology is directed are the most recent year's graduates of any (or all) collegiate health professions education degree programs.

(2) Survey Design

Graduates are asked to furnish data by filling out and returning a mailed questionnaire approximately 18 months after receiving their health professions degree. Respondents to the initial questionnaire will be surveyed again three and a half years later or approximately five and a half years after receiving their degrees.

The first survey can be used alone to provide a cross-sectional study of graduates; a description of the educational and career activities of graduates at one point in time--18 months after receiving their health professions degrees.

The second survey, administered three years later, turns the study into a longitudinal panel study.(1) Panel studies involve the collection of data over time from the same group of respondents. Information collected at different points in time will enable the researcher to report changes in career and educational development and geographical mobility.

Panel studies have one inherent shortcoming which should be noted. This is panel attrition which is the extent of non-response that occurs in the later waves of a study. Some persons interviewed in the first study may be unwilling or unable to be surveyed later on, or the researcher may not be able to obtain the current address of a respondent interviewed some time ago. Since the strength of a panel study depends on the ability to examine the same respondents over time, this advantage is lost among those who do not respond to both surveys.

Therefore, this methodology does not suggest a follow-up study which extends over more than five years from the time of graduation. Panel attrition also points to the necessity of getting the highest response rate possible on the first survey since the validity of conducting the second follow-up hinges on the response rate from the first survey.

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(1) See Earl R. Babbie, Survey Research Methods, pp 64-65.

(3) The Question of Sampling

Since this methodological guide is written primarily for individual colleges, no sampling design is suggested for this survey. For a variety of reasons (small size of many academic programs, desire to keep in contact with each graduate), colleges usually prefer to survey the entire population of graduates in a given year. If, on the other hand, the follow-up study was done on a state level by a state coordinating or planning agency with differing research priorities, a sample survey would be more economical and possibly of higher quality. This sample could be stratefied by health professions type and degree level or by institutional sector(e.g., four-year college versus two-year college).

(4) Prototype Surveys

Exhibits 1 and 2 of this narrative present prototype survey instruments for this study. The final questionnaires should be printed in a booklet form on 8 1/2" by 11" pages. Each question and response is numbered so that the survey form is self-coding and keypunching can be accomplished directly from the returned questionnaire with a minimum of editing. A cover letter signed by the president of the college or university should be included to transmit the survey and explain the purpose of the study. Sample draft of these cover letters are included here (Exhibits 3 and 4).

Since the survey is directed at the population of graduates rather than at a small random sample,and its resultant data are to be aggregated at the state level, it is necessary to design a relatively structured and standardized form. The survey forms consists of predominately close-ended, alternative response items. The forms include some reliability checks. The respondent is asked to correct any personal information on the address label and his or her curriculum at the college. This will give the college an opportunity to verify information on its student records.(2)

To assist in the longitudinal follow-up effort, the last item on the 18-month follow-up survey asks the respondent to provide the name and address or someone who would know that individual's address in the future. The procedure is designed to reduce the number of inactive names that occurs over time as graduates change addresses. By retaining this information as a secondary address reference, contact with a graduate after 18 months follow-up is greatly facilitated.

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(2) Adopted from E. Timothy Lightfield, "Student Follow-Up in Higher Education: A Systematic Approach.

d. Assembly and Distribution of the Surveys[3]

(1) Materials for the Survey

(a) Population Listings and Computer Printed Address Labels

At the end of the graduation period of study, the institution's Data Processing or Computer Services Office should be asked to provide an alphabetical listing (print-out) of the population of health professions program graduates. The alphabetical listing of these graduates should contain the following information:

- Social Security number (college I.D. or other identifying number)
- Last name, first name, middle name or initial
- Curriculum of Study (Two-digit code)
- Type of Degree Received (One-digit code)

In addition to the alphabetical listing, request should be made for the printing of six sets of pressure sensitive address labels for each student.[4] Each address label should contain the following information:

- Social Security number, college I.D. or other identifying number
- First name, middle initial or name, last name
- Street address
- City, state, zip code
- Curriculum of Study (Two-digit code)
- Type of Degree Received (One-digit code)

The labels should be printed alphabetically or in ascending order by Social Security number.

The same procedures should be followed for the four-year follow-up except that address listings and labels should be prepared from a computer tape of respondents and corrected addresses developed from the 18-month follow-up.

(b) Other Materials for the Survey

Sufficient copies of the survey form should be printed several months in advance of the actual

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(3) Ibid.
(4) The exact number of sets of address labels is a function of the number of mailing waves contemplated.

mailings. The follow-up procedures suggested here allow for at least two waves for the distribution of the survey forms. So at least twice the number of surveys and cover letters as the anticipated population of health professions graduates should be printed. In addition to the actual survey forms and cover letters, the following supplies are necessary for administering the survey and should be obtained prior to the anticipated initial mailing date.

- Number 9 self-addressed and stamped business envelopes returnable to the College and specifically to the Research Office - enough for twice the population.
- Number 10 envelopes with return address of the college, and specifically the Research Office - enough for twice the population.
- Rubber hand stamps for each individual health professions program of the college with name and two-digit numeric code number of that program (may be eliminated if Research Office wishes to type or write the curriculum in the designated place on the survey form).

(2) First Wave of Mailings

A pressure sensitive address label from one complete set of labels should be placed on the designated space on the survey form. A like label from the second set of labels should be placed on the Number 10 mailing envelope. According to the curriculum code provided on the address label, the appropriate rubber hand stamp should be used to print out the program name in the space provided below the address label.

This mailing and each successive replacement mailing should consist of the following contents placed in the Number 10 labeled mailing envelope:

- Survey form with address label
- Cover letter
- Self-addressed and stamped return envelope

A record should be made and posted of the exact number of forms distributed and the date of mailings.

(3) Monitering Returned Questionnaires

When a completed survey form is received by the institutional reseach office the following steps should be taken:

(a) A check mark should be entered beside the graduate's name on the alphabetical listing of the population.

(b) The date of the return of the form should also be indicated on the alphabetical listing.

(c) Each survey should be assigned an identification number (separate from the graduate's Social Security number of other identifer). This number should be consecutively assigned and written in the upper left hand corner of the first page of the survey form. It should also be recorded on the alphabetical listing of the population of health professions program graduates by the particular respondent's name. Such numbers will be used later on in estimating non-response biases in the survey.

(d) At the same time the recordings are made on the alphabetical listing, the label for that graduate from the third, fourth, fifth and sixth sets of address labels should be removed. This procedure provides a gradually eliminating list of the non-respondents for each wave of the follow-up mailings. Three of those removed labels should be discarded. The fourth should be affixed to a cumulative listing of respondents. Corrections should be made on that list. Also, the telephone number for each graduate from the alpha list should be noted on this respondents list. This list of respondents will be used to prepare an alpha list and address labels for the second longitudinal follow-up survey.

(e) Prepare two return rate tables. The first table should identify the number of questionnnaires returned each day from Day 1 (the date the questionnaires are mailed) to the cut-off date for returned questionnaires. The second table should identify the cumulative number of percentage of the questionnnaires that were returned, starting with the date that the questionnaires are mailed as Day 1 and ending with the designated cut-off date. The advantages of these two tables are that they allow you to keep track of response rates to the mailed questionnaires and they identify the size of the follow-up mailings that will be necessary.(5)

(4) Return of Non-Completed Survey Forms

Surveys returned because of an inaccurate address are to be logged with the notation "BA" for "bad address" on the alphabetical listing. Normally, these "return to sender" returns will be made within a few days after the questionnaires are mailed out and usually before the receipt of any completed surveys.

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(5) Procedure suggested by Babbie, op. cit. pp. 163-164.

At the same time, the label for the graduate from the third, fourth, fifth and sixth sets of labels should be removed. Three of extra labels should be discarded, the fourth affixed to a cumulative listing of "bad addresses". From this list, searches can be made from area phone books, etc., to determine an alternative address to which questionnaires in the second wave of mailings can be sent.

(5) Follow-Up Procedures (Subsequent Mailings)

In order to increase the response rate to the survey, a set of follow-up procedures including: (a) a reminder postcard, (b) a follow-up letter and questionnaire and (c) a telephone follow-up is suggested.

(a) Second Wave of Mailings-Postcard Reminder

Approximately 10-14 days after the initial mailing of the survey forms, a second wave of mailings is to be sent to all non-respondents to date. The mailing shall consist of a printed postcard stressing the importance of receiving the individual's response. The postcard should include the telephone number of the Research Office so that the graduate can request an additional copy of the form. The cards can be printed on postcard stock paper and cut to the appropriate size (Exhibit 5).

(b) Third Wave of Mailings

Approximately 10-14 days after the postcard follow-up, a replacement questionnaire is to be sent to all non-respondents to date. The mailing shall consist of a replacement questionnaire, self-addressed return envelope and a special letter of request. The special letter of request should indicate that while the graduate has not yet responded, it is important for him/her to do so. This letter should be printed on college letterhead and individually signed. (Exhibit 6).

The fourth and fifth sets of address labels, with labels from respondents removed, are to be used for this mailing. The same procedures for affixing the address labels on the survey form and for identifying the curriculum code should be followed.

A record should be made and posted of the exact number of replacement questionnaires distributed and the date of the mailing. Survey forms received after the date of the mailing should be considered a consequence of the third wave of mailings.

(c) Telephone Follow-Up for the 18-month Study (Optional)

Since the four year follow-up survey hinges on the response rate to the 18-month study, it is suggested that a telephone follow-up of non-respondents be undertaken. The purpose of the telephone follow-up is to ascertain whether the form has been received and to request the cooperation of the graduate in completing the survey form. The purpose of the follow-up is not to gather information from the graduate (i.e., conduct a telephone interview).

The alpha listing which includes a telephone number for each graduate should be used for this purpose. The telephone follow-up should be conducted 7-10 days after the third wave of mailings. Individuals making the telephone contacts should be rehearsed prior to initiation of the telephone follow-up effort. The caller should identify him or herself and the college to whomever answers the telephone and to request permission to speak to the graduate. If the graduate is no longer living at that location, the caller should ask how he or she can contact the graduate. The caller should refer to the graduate by name. When speaking to the graduate, the caller should emphasize the importance of the study and the individual importance of each respondent's completion of the form. If the graduate should indicate that he/she never received the survey, the address should be obtained and a replacement questionnaire forwarded.

Some graduates may not be reached during the day, and, thus, it may be necessary to attempt to call during evening hours. At least one day and one evening attempt to contact the graduate by telephone should be made.

(6) Completion of the Process of Administrating the Survey

About 14 days after the final wave of markings and/or telephone contacts, the administration of the survey should be considered as completed. The whole process of administrating the survey takes approximately six weeks.

The number of returned surveys resulting from each wave of mailing should be counted and recorded along with the total number of "bad addresses". This information should be used to document overall response rates and should be included in the eventual research report.

e. Acceptable Response Rates and Tests for Non-Response Bias

(1) Acceptable Response Rates

An acceptable response rate is important so valid conclusions can be made about the follow-up survey's results. The body of inferential statistics used in conjunction with survey results assume that all members of the initial sample or surveyed group (in this case, all health professions program graduates) complete and return their questionnaire. Since this almost never happens, response bias becomes a concern. The researcher must test for the possibility that non-respondents differ from respondents in some significant way.(6) If so, there may be severe selection biases which may affect the validity of the survey statistics.

Overall response rate is one guide to the representativeness of respondents. If a high response rate (low non-response rate) is achieved, there is less chance of a significant response bias than if a low rate is achieved. In mail surveys relate to post-secondary education, response rates vary from 30 to 80 percent depending on the type of respondent.(7) Despite the variety of response rates reported by mail surveys, the following rule of thumb has been suggested:

> ...a response rate of at least 50 percent is adequate for analysis and reporting. A response rate of at least 60 percent is good. And a response rate of 70 percent or more is very good. The reader should bear in mind, however, that these are only rough guides, they have no statistical basis, and a demonstrated lack of response bias is far more important than a high response rate.(8)

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(6) *Ibid*., p. 165.
(7) Sidney S. Micek, "Guidelines for Developing and Implementing Questionnarire Surveys," NCHEMS, 1975.
(8) Babbie, *op*. *cit*., p. 165.

(2) Computing Response Rates

A common procedure for computing response rates can be used as follows:

(a) Identify the number of health professions program graduates who were mailed surveys in the initial mailing.

(b) Subtract the number of persons who did not receive surveys due to "bad addresses" from the total number who were mailed surveys during the first wave of mailings. This the net number of persons who received questionnaires.

(c) Divide the number of respondents by this net number. This percentage measures how successful the survey was in getting people to participate. The researcher does not count against him/herself those whom he/she could not contact.

However, it should be pointed out that although this is the accepted practice, it rests on the assumption that non-deliverable questionnaires present a random sample of the initial sample. This may not be the case at all. Persons whose questionnaires cannot be delivered are at the very least, probably more mobile than others in the sample, and mobility may be related to a variety of other variables.(9)

(3) Tests to Measure Non-Response Bias

This guide suggests repeat mailing to non-respondents and a telephone follow-up in order to attain as high a response rate as possible. When every effort has been made to achieve an acceptable response rate, the next step is to roughly measure the extent of non-response bias that may be present so that the results of the survey data analysis can be adjusted if necessary. Two ways of ascertaining the existance and extent of selection bias are suggested here.

(a) Comparing Early and Late Respondents

The first alternative, mentioned earlier, uses the serialized identification number assigned to completed questionnaires as they are received by the College's Research Office. Babbie presented the following example of how these numbers can be useful in estimating non-response bias:

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(9) *Ibid.*, pp. 165-166.

> ... if grade-point averages (GPA) reported by students decrease steadily through the data collection, with those replying right away having higher GPA's and those replying later having lower GPA's then the researcher might tentatively conclude that those who failed to answer at all have lower GPA's yet.(10)

For instance a chi-square test can be conducted to test for differences between the first mailing's respondents and those who responded after the telephone follow-up. An alternative would be to use the serialized number itself as a variable to test the correlation between it an a survey variable (e.g., unemployment rates).

At a minimum the following factors should be examined for non-response bias:

- Location of residence (State)
- Main purpose in pursuing health professions degree
- Satisfaction with educational program
- Working status
- Reason for unemployment
- Percentage working in the field of their health profession degree
- Location of employer (State)

While it would not be advisable to make statistical estimates of bias in this fashion, the researcher can take advantage of approximate estimates.(11) At the very least, these comparisons should be done before conducting the second alternative suggested here, a telephone survey of a sample of non-respondents.

(b) Procedure for Sequential Non-Respondent Sampling(12)

In order to test for differences between respondents and non-respondents for either survey, the following procedure can be used to conduct a telephone survey of a sequential sample of non-respondents. This telephone survey (Exhibit 7) solicits information on a minimum number of important variables:(13)

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(10) Ibid., p. 163.

(11) Ibid., p. 163.

(12) This procedure was developed by J. Tschecthtelin and documented in Maryland Community Colleges, Student Follow-Up Study: First Time Students, Fall 1972, Appendix C.

(13) This example is a prototype survey for the 18-month follow-up.

- Location of residence (State)
- Main purpose in pursuing health profession degree
- Satisfaction with educational program
- Working status
- Reason for unemployment
- Percentage working in the field of their health profession degree
- Location of employer (State)
- Percentage pursuing/pursued an advanced degree program

The researcher is, of course, free to alter the suggested telephone survey if he or she is interested in examining additional or different variables. At any rate, after the telephone survey is finalized, the following steps should be taken to document non-respondent data and measure the differences between respondent and non-respondent groups:

1. Identify the list of non-respondents (NR's) excluding "bad addresses" using the alphabetical list which also contains telephone numbers. Number each non-respondent on the list from 1 to n.
2. Prepare a "Cumulative Percent Yes" sheet for each of the yes-no items that the NR's will be asked. (Exhibit 8). Follow these steps:

- Draw a solid line on graph to represent the unadjusted percent yes or positive for that item among the respondents from the survey.
- Decide what percent error you are willing to tolerate and draw dashed lines corresponding to that tolerance level above and below the solid line representing the percent yes among respondents. Plus or minus ten percent is suggested. See Exhibit 8 example.
- Randomly select one NR, using a table of random numbers or other random number scheme
- Telephone the NR and follow the non-respondent Telephone Interview Form. If the NR is not at home or has moved, call later or get a new number. Answers should not be taken from anyone but the NR. If a complete dead end is reached, discard the NR and select a new one.
- After about 30 valid NR interviews, record the NR answers on the proper Cumulative Percent Yes sheets, line a. Put "1" for a yes and "-" for a no or other response. Put the cumulative number yes on line b. Compute the Cumulative

Percent Yes by dividing line b by line c (the interview number). Enter this on line d, and plot this Cumulative Percent Yes on the graph. See example.

- Check each graph to see if the Cumulative Percent Yes is beginning to stabilize (level off). If it stabilizes at or inside your error tolerance limits you can conclude that your NR's are similar to your respondents' on that item. If the Cumulative Percent Yes stabilizes outside your error tolerance limits, your NR's are apparently different from your respondents on that itam.
- If the graph is still climbing or falling after 30 interviews, keep calling NR's until the graph levels off. You will probably need at least 50 interviews. This is a practical test, not a hard statistical one. However, the researcher could do a chi-square test with this data to test for significant differences between respondents and non-respondents. The sampling error can also be checked to find the probability that your sample of NR's truly represents the NR group.

f. Data Processing and Storage of Survey Results

(1) Storing Address File of Respondent's for Five-Year Follow-Up Study

Once all the surveys have been received, the address list of respondents with name and address corrections should be completed. This list, along with the respondent's Social Security number or other identifying number should be keypunched and stored on tape by the College's Computer or Data Processing Services. This tape will be used to generate an alpha list and address labels for the longitudinal follow-up study.

(2) Data Processing and Storage of Survey Data

(a) Editing and Keypunching Completed Surveys

The questions and responses on the portotype surveys have been numbered so that keypunchers can punch directly from the questionnaires. Since the punch direct method will be used, questionnaires will have to be edited prior to punching. An editor should read through each questionnaire to ensure that each question has been answered, that there are no multiple answers (change to a single code), that non-responses are properly coded and to clarify any unclear responses.

Following keypunching and vertification a data card deck and duplicate deck should be retained for tape storage and analysis using a computerized statistical package appropriate for survey data analysis.

(b) Codebook Construction

A codebook is a document designed for each survey that describes the location of variables in the survey data file and the keypunching assignments given to specific attributes making up those variables. A codebook performs three essential functions. First, it is the primary guide to editors as they prepare questionnaires for keypunching. Second, it is the basis upon which a computer program can be written to place the data on magnetic tape or disk so that various analyses can be conducted. Third, it is the researcher's guide to locating variables in his/her data file during analysis.

The codebooks developed for the prototype surveys appear in Appendix II of this report. They are designed to complement most well known statistical packages used in analysis of survey data by researchers with little or no expertise in computer programming or data processing.

(c) Storage of Survey Data for Analysis

After the survey data has been keypunched it must be stored on a magnetic tape or disk to facilitate statistical analysis. A number of statistical packages have been developed which will create data files, label data, store it on computer tape or disk and perform a wide range of statistical analyses. One or more of these packages are usually available to collegiate researchers through their institutions' data processing or computer centers. Two recommended packages are:

SPSS - Statistical Package for the Social Sciences by N.H. Nie, D.H. Bent, C.H. Hull, et.al., McGraw-Hill Book Co., New York, 1975

Data-text Primer, An Introducation to Computerized Social Data Analysis by D.J. Armor and A.S. Couch, The Free Press, New York, 1972.

The software for these programs (especially SPSS) are available at or can be easily acquired by most academic computer centers. These programs are suggested for two reasons. First, as already noted, they can be utilized by researchers with little or no experience in data processing or computer programming. Second, the data files created by either program can be easily updated to include data from the second, five-year follow-up survey to create a longitudinal data base for analysis.

g. Strategy for State-wide Coordination of Survey Data

The creation of a state-level data base on health professions program graduates cannot be accomplished without the full cooperation of the individual academic institutions offering health professions education programs. This data collection activity must be coordinated with the colleges' general, on-going graduated student survey efforts. If this is not done, duplicate surveys may confuse respondents and result in high non-response rates for both studies. Coordination may be accomplished in two ways:

1. If the academic institutions agree to forego their post-graduation survey of health professions programs graduates, the state-level agency can conduct the tracking survey.
2. This special survey of health professions program graduates can be integrated in some fashion with each college's usual tracking efforts.

There are problems inherent in both approaches.

With regard to the first alternative, many colleges with on-going tracking efforts will be reluctant to abandon their prerogative even if the State-level agency finances the study. Also respondents may be reluctant to complete a survey sponsored by a state level agency rather than the institution from which they graduated. If this route is chosen provisions must be made to insure that the survey is responsive to the data needs and interests of the institutions as well as the the state agency. This could be accomplished through an oversight or advisory committee made up of representatives from each participating institution.

Integration of the health professions tracking survey with each institution's on-going survey efforts also presents problems. First, if the data collected in this manner is to be aggregated into a sound state-level data base, each institution must survey their students at the same time, asking the same questions and following the same survey administration procedures. If colleges survey their graduates at different times and in different ways, as most do, they must be pursuaded to adopt a uniform survey and procedures or at least to adopt a set of core questions for health professions graduates into their own general student surveys. This could be accomplished through survey workshops conducted by the State-level agency for each college's placement officers and/or institutional researchers.

EXHIBIT 1

Post-Graduation Study of Health Professions Graduates

Unit #

Mailing Label

IF INFORMATION ON THE LEFT IS NOT CORRECT PLEASE PRINT CORRECTIONS BELOW:

MAJOR FIELD OF STUDY: ____________________

PLEASE READ EACH QUESTION CAREFULLY AND CIRCLE THE NUMBER NEXT TO YOUR ANSWER (FOR EXAMPLE ①).

1. *What was your main purpose in pursing the health professions degree you received in 197_? Please check the one best answer.*

   1 To prepare for further education
   2 To upgrade or improve skills in my professional field
   3 To prepare for immediate first-time employment in a particular health profession
   4 For career advancement in my professional field
   5 For personal growth and social development
   6 Other please specify: ______________________________

2. *Considering your purposes and goals in pursuing your 197_ degree, how satisfied were you with this educational program?*

   1 Very satisfied
   2 Satisfied
   3 Somewhat dissatisfied
   4 Very dissatisfied

3. *At the present time what is your working status?*

   1 Working full-time (at least 35 hrs./wk.)
   2 Working part-time (less than 35 hrs./wk.) but seeking a full-time job
   3 Working part-time (less than 35 hrs./wk.) and not seeking a full-time job
   4 Not working but seeking a job
   5 Not working and not seeking a job

   PROCEED TO QUESTION 11. ← 4, 5

4. *Are you employed in the health field in which you received your 197_ degree?*

   1 Same field
   2 Closely related health field
   3 Somewhat related health field
   4 Completely different health field
   5 Completely different non-health field

   PROCEED TO QUESTION 7. ← 5

5. In which of the following settings do you spend most of your working time? Please check one.

1 Hospital
2 Nursing home
3 Prison or other institution
4 Private medical/dental laboratory
5 Elementary/secondary school
6 College/university
7 Free standing outpatient clinic
8 Private practitioner's office
9 Health maintenance organization
10 State or local health department
11 Manufacturing firm
12 Other business firm
13 Armed services
14 Other specify: ______________________________

6. How much of your working time, if any, is devoted to each of the following job activities? Please circle one answer for each work activity.

	Working Time		
Job Activity	Most	Some	None
Direct patient care (e.g., bedside, rehab.)	1	2	3
Indirect patient care (e.g., lab work)	1	2	3
Administration/Supervision	1	2	3
Clerical duties (e.g., typing, billing)	1	2	3
Research	1	2	3
Teaching	1	2	3
Other please specify: ____________________	1	2	3

7. If you are not employed in the same field as your 197_ degree, why?

1 Employed in same field

2 Never planned to work in this field
3 Could not find a job in this field
4 My educational preparation was not adequate for a job in this field
5 Do not have certification or licensure for employment in this field
6 Decided I did not like the work in this field
7 Too little opportunity for advancement in this field
8 Developed a new career interest
9 A better paying job came along
10 Other please specify: ______________________________

8. *Were you employed in your current occupational field before you received your 197_ degree?*

1 Yes
2 No

9. *Where is your present employer located? If you have more than one job, where is your main employer located?*

1 New Jersey
2 New York
3 Pennsylvania
4 Other State

10. *How would you best describe your current job?*

1 Temporary job until a better one can be found
2 Temporary job to earn money to do something else (e.g., travel, go to school)
3 Job with possible career potential
4 Job with definite career potential
5 Other please specify: ____________________

11. *If your are not working, what is the main reason?*

1 I am employed

2 Family responsibilities
3 Going to school
4 Ill or disabled
5 Cannot find the kind of job I want
6 Cannot find any job
7 Do not wish to work right now
8 Other reason please specify: ____________________

12. *Are you currently enrolled in an educational program leading to a degree?*

1 Yes
2 No → PROCEED TO QUESTION 17.

13. *What type of a degree are you pursuing?*

1 Certificate or diploma
2 Associate degree
3 Bachelor's degree
4 Master's degree
5 Professional doctorate (MD, DDS)
6 Other doctorate (Ph.D, Ed.D)
7 Other degree please specify: ____________________

14. Where is the degree program located?

1 New Jersey
2 New York
3 Pennsylvania
4 Other State

15. Is this degree program in the same field as the degree you received in 19__?

1 Same field
2 Closely related field
3 Somewhat related field
4 Completely different field

16. How well did the educational program for your 19__ degree, prepare you for work on your current degree program?

1 Not related to my current degree program
2 Excellent preparation
3 Good preparation
4 Fair preparation
5 Poor preparation

17. Do you currently hold a state-issued license to practice the health professions in which you earned your 197_ degree? If yes, please circle the states in which you hold a license.

1 Do not currently hold a license

2 New Jersey
3 New York
4 Pennsylvania
5 Other State

18. Did you hold this license before you received your 197_ degree?

1 Do not hold a license

2 Yes
3 No

19. Do you currently hold professional certification awarded by a national professional certifying association or organization?

1 Yes What is your designation: ______________________
(e.g., MLT (ASCP)

2 No

20. Did you hold this certification before you received your 197_ degree?

1 Do not hold certification

2 Yes
3 No

NOW THAT YOU HAVE COMPLETED THE PART OF THE QUESTIONNAIRE DEALING WITH EMPLOYMENT AND EDUCATIONAL EXPERIENCES, PLEASE ANSWER THE FOLLOWING QUESTIONS FOR USE IN STATISTICAL INTERPRETATION OF THE SURVEY.

21. In what year were you born? 19__

22. What is your sex?

1 Male
2 Female

23. How would you describe yourself?

1 American Indian or Alaskan Native
2 Black, not of Hispanic origin
3 Asian, Oriental or Pacific Islander
4 Hispanic
5 White, not of Hispanic origin

IMPORTANT: What is the name of a person who will know your address in the future?

Name: ______________________________
Street: ______________________________
City: ____________________ State: ________
Zip: __________

THANK YOU FOR YOUR COOPERATION

Five-Year Follow-Up Study of
Health Professions Graduates

Unit #

Mailing Label

IF INFORMATION ON THE LEFT IS NOT
CORRECT PLEASE PRINT CORRECTIONS BELOW:

PLEASE READ EACH QUESTION CAREFULLY AND CIRCLE THE NUMBER NEXT TO YOUR ANSWER (FOR EXAMPLE ①).

1. At the present time what is your working status?

1 Working full-time (at least 35 hrs./wk.)
2 Working part-time (less than 35 hrs./wk.) but seeking a full-time job.
3 Working part- time (less than 35 hrs./wk.) and not seeking a full-time job.
4 Not working but seeking a job
5 Not working and not seeking a job

PROCEED TO QUESTION 11. ← 4, 5

2. Are you currently employed in the health field in which you received your 197- degree?

1 Same health field
2 Closely related health field
3 Somewhat related health field
4 Completely different related health field
5 Completely different non-health field

PROCEED TO QUESTION 5. ← 5

3. In which of the following settings do you spend most of your working time? Please check one.

1 Hospital
2 Nursing home
3 Prison or other institution
4 Private medical/dental laboratory
5 Elementary/secondary school
6 College/university
7 Free-standing outpatient clinic
8 Private practitioner's office
9 Health maintenance organization
10 State or local health department
11 Manufacturing firm
12 Other business firm
13 Armed services
14 Other please specify: ______________________

4. *How much of your working time, if any, is devoted to each of the following job activities? Please circle one answer for each work activitity.*

	Working Time		
Job Activity	*Most*	*Some*	*None*
Direct patient care (e.g., bedside, rehab.)	1	2	3
Indirect patient care (e.g., lab work)	1	2	3
Administration/Supervision	1	2	3
Clerical duties (e.g., typing, billing)	1	2	3
Research	1	2	3
Teaching	1	2	3
Other please specify: ______			

5. *If you are not currently employed in the same field as your 197 _ degree, why?*

1 *Employed in same field*
2 *Never planned to work in this field*
3 *Could not find a job in this field*
4 *My educational preparation was not adequate for a job in this field*
5 *Decided I did not like work in this field*
6 *Too little opportunity for advancement in this field*
7 *Do not have certification or licensure for employment in this field*
8 *Developed a new career interest*
9 *A better paying job came along*
10 *Other please specify:* ______

6. *Where is your present employer located? If you have more than one job, check where you main employer is located.*

1 *New Jersey*
2 *New York*
3 *Pennsylvania*
4 *Other state*

7. *How long have you been working at your current job?*

1 *Less than one year*
2 *1 - 2 years*
3 *3 - 5 years*

8. *How would you best describe your current job?*

1 *Temporary job until a better one can be found*
2 *Temporary job to earn money to do something else (e.g., travel, go to school)*
3 *Job with possible career potential*
4 *Job with definite career potential*
5 *Other please specify:* ______

9. In retrospect, how well did the educational preparation for your 197_ degree prepare you for your current job?

1 Current job is not related to 197_ degree
2 Excellent preparation
3 Good preparation
4 Fair preparation
5 Poor preparation

10. Please indicate both the yearly salary you earned on your first job after receiving your 1977 degree and your present yearly salary. Check one answer in each column.

FIRST JOB	CURRENT JOB
1 Less than $3,000 per year	1 Less than $3,000 per year
2 $3,000 - $5,999 per year	2 $3,000 - $5,999 per year
3 $6,000 - $8,999 per year	3 $6,000 - $8,999 per year
4 $9,000 - $11,999 per year	4 $9,000 - $11,999 per year
5 $12,000 - $14,999 per year	5 $12,000 - $14,999 per year
6 $15,000 - $17,999 per year	6 $15,000 - $17,999 per year
7 $18,000 - $20,999 per year	7 $18,000 - $20,000 per year
8 $21,000 and over per year	8 $21,000 and over per year

11. If your are not working, what is the main reason?

1 I am employed

2 Family responsibilities
3 Going to school
4 Ill or disabled
5 Cannot find the kind of job I want
6 Cannot find any job
7 Do not wish to work right now
8 Other reason please specify: ____________________

12. What is the highest degree you have received or are currently pursuing beyond the degree you earned in 197_?

PROCEED TO QUESTION 16. ← 1 Have not received and/or am not currently pursuing another degree
2 Certificate or diploma
3 Associate degree
4 Bachelor's degree
5 Master's degree
6 Professional doctorate (MD, DDs)
7 Other doctorate (Ph.D., Ed.D.)
8 Other degree please specify: ____________________

13. Where is this degree program located?

1 New Jersey
2 New York
3 Pennsylvania
4 Other state

14. Is this educational program in the same field as tha degree you received in 19__?

    1 Same field
    2 Closely related field
    3 Somewhat related field
    4 Completely different field

15. How well did the educational program for your 19__ degree prepare you for work on this degree program?

    1 Not related to my current degree program

    2 Excellent preparation
    3 Good preparation
    4 Fair preparation
    5 Poor preparation

16. Do you currently hold a state-issued license to practice the health professions in which you earned your 197_ degree? If yes, please check the states in which you hold a license.

    1 Do not currently hold a license

    2 New Jersey
    3 New York
    4 Pennsylvania
    5 Other State

17. Do you currently hold professional certification awarded by a national professional certifying association or organization?

    1 Yes What is your designation: ____________________
    (e.g., MLT (ASCP)

    2 No

THANK YOU FOR YOUR COOPERATION

EXHIBIT 3

COLLEGE LETTERHEAD

(Date)

Dear Graduate:

_________________________ College/University is conducting an 18 month follow-up study of its graduates who received degrees in a health profession in 19__.

Will you please take a few minutes to complete the enclosed survey and mail it back to us in the self-addressed envelope?

The purpose of the study is to find out what our 19__ health profession graduates are doing now, about a year and a half after graduation. Survey findings will be extremely useful to the College in planning and improving our health-related programs. There is much to be learned from your post-college experiences, and present and future students will benefit from your experiences and reactions.

The study includes every 19__ graduate who received a degree in every health professions program offered by _________________ College/University. Your answers to the questionnaire will be reported in aggregate form only; no personally identifying information will be reflected in any reports or use of the data. If there are any questions you would prefer not to answer, however, please complete the other questions and return the questionnaire to us.

As a recent graduate, you are in good position to help us assess how well our health professions programs are serving our students. Your cooperation is needed to make the results of the study complete and accurate. Please take the time to help us learn from your experiences.

Sincerely,

College/University Presidents

EXHIBIT 4

COLLEGE LETTERHEAD

(Date)

Dear Graduate:

________________ College/University is conducting a five year follow-up study of its graduates who received degrees in a health profession in 19__.

Will you please take a few minutes to complete the enclosed survey and mail it back to us in the self-addressed envelope.

The purpose of the study is to find out what our 19__ health professions graduates are doing now, about five years after graduation. There is much to be learned from your long-range, post-college experiences. Survey findings will be extremely useful to the College in planning and improving our health-related programs. Present and future students will benefit from your experiences and reactions.

Your answers to the survey will be reported in aggregate form only; no personally identifying information will be reflected in any reports or use of the data. If there are any questions you would prefer not to answer, however, please complete the other questions and return the questionnaire to us.

As an alumnus you can help us assess how well our health professions programs serve our students. Your cooperation is needed to make the results of the study complete and accurate. Please take the time to help us learn from your experiences.

Sincerely,

College/University Presidents

EXHIBIT 5

SAMPLE POSTCARD REMINDER

Date

Office of Research
________________ College/University

Dear Health Professions Graduate:

About two weeks ago, you were sent a survey concerning your experiences since graduating from ______________ College/University. To date we have not received a completed form from you.

Please complete the form and return it to us.

If you do not have this form we sent you, please call Name at Telephone # so we can send you a copy. Thank you.

EXHIBIT 6

COLLEGE LETTERHEAD

(Date)

Dear Graduate:

About three weeks ago, you were mailed a survey which asked for your cooperation in completing the information requested. The purpose of the survey is to find out what our 19__ health professions graduates are doing now.

To date, we have not received your completed survey form. It is especially important that we have your opinions and responses.

Please take a few moments, therefore, and complete the enclosed survey form.

If you have any reservations or questions, please do not hesitate to call, and I will do my best to answer them for you. My telephone number is ____________.

Thank you for your cooperation.

Name
Position
Campus Address

EXHIBIT 7

NON-RESPONDENT INTERVIEW FORM

Trial #:_________________ Student ID #____________________
(SS #)

Telephone #:____________________

A. Does non-respondent reside in New Jersey: YES_____ NO______
(Circle one)

Hello, my name is ________________ from ____________________ College. Is this ______________________? (If not the respondent, ask when, where, how the person can be reached.) We are doing a survey of all 19__ graduates of our health professions programs to find out what they are doing now. The information you can provide will help the college in assessing the success of its programs. There are only a few questions. The survey will not take more than five minutes.

B. What was your main purpose in pursuing the health professions degree you received in 19__? (READ ALL ALTERNATIVES TO NR AND CIRCLE ONE THE REST WILL BE CODED AS NO'S ON THEIR CUMULATIVE PERCENT YES SHEETS.)

B1 To prepare for further education
B2 To upgrade or improve skills in my professional field
B3 To prepare for immediate first time employment in a particular health profession
B4 For career advancement in my professional field
B5 For personal growth and social development

C. Considering your purposes and goals in pursuing your 19__ degree, were you satisfied with this educational program?

YES NO

D. At the present time, are you working?

YES NO → SKIP TO ITEM H.

E. Are you employed full-time?

YES NO

F. Are you employed in the health field in which you received your 19__ degree? (READ ALL ALTERNATIVES TO NR AND CIRCLE ONE.)

F1 Same field
F2 Closely related field
F3 Somewhat related field
F4 Completely different field

G. Is your present employer located in New Jersey?

YES NO

NOW SKIP TO ITEM J.

H. FOR UNEMPLOYED ONLY:

Are you presently seeking a job?

YES NO

I. What is the main reason you are not working at this time? (READ ALL ALTERNATIVES TO NR AND CIRCLE ONE.)

I1 Family responsibilities
I2 Going to school
I3 Ill or disabled
I4 Cannot find the kind of job I want
I5 Cannot find any job
I6 Do not wish to work right now
I7 Other

J. Are you presently enrolled in an education program leading to a degree beyond the one you received in 19__?

YES NO → SKIP TO END

K. Are you enrolled full-time in that program?

YES NO

L. Is this educational program in the same field as the degree you received in 19__? (READ ALL ALTERNATIVES TO NR AND CIRCLE ONE.)

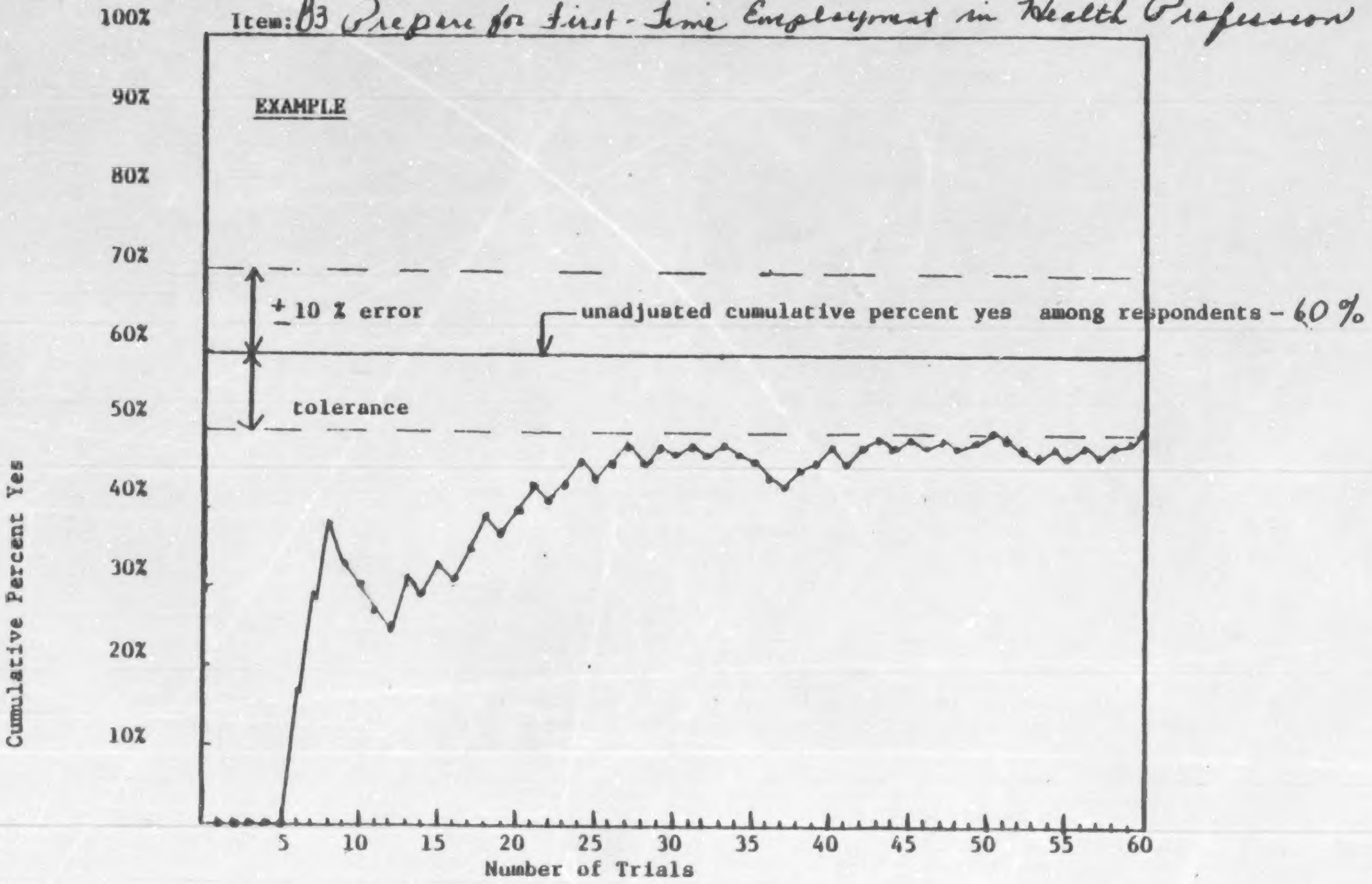
L1 Same field
L2 Closely related field
L3 Somewhat related field
L4 Completely different field

THANK YOU FOR YOUR COOPERATION

CUMULATIVE PERCENT YES -- SEQUENTIAL SAMPLI[illegible] OF NON-RESPONDENTS

EXHIBIT 8

Item: B3 Prepare for First-Time Employment in Health Profession



a. Answer (yes=1)	–	–	–	–	–	/	/	/	–	–	–	–	/	–	/	–	/	/	–	/	/	–	/	/	–	/	/	–
b. Cum. #yes	0	0	0	0	0	1	2	3	3	3	3	3	4	4	5	5	6	7	7	8	9	9	10	11	11	12	13	13
c. Trial #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
d. Cum. %yes	0	0	0	0	0	17	29	38	33	30	27	25	31	29	33	31	35	39	37	40	43	41	43	46	44	46	48	46

a. Answer	/	–	/	–	/	–	–	–	–	/	/	/	–	/	/	–	/	–	/	–	/	/	–	–	/	–	–	/	–	/	/	/
b. Cum. %yes	14	14	15	15	16	16	16	16	16	17	18	19	19	20	21	21	22	22	23	23	24	25	25	25	26	26	26	27	27	28	29	30
c. Trial #	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
d. Cum. %yes	48	47	48	47	48	47	46	44	43	45	46	48	46	48	49	48	49	48	49	48	49	50	49	48	49	48	47	48	47	48	49	50

C. TASK 3: Development of a Methodology to Document the Level of Retention of Health Profession Graduates in a State's Work Force

1. STATUS OF TASK 3

This task had both short-run and long-run purposes. The short-run goal was to conduct an immediate check on the projection methodology's assumptions concerning the in-state retention of health professions program graduates by examining existing data on the location of these graduates collected by New Jersey colleges.

To meet the long-run goal of documenting retention rates in an on-going fashion, it was envisioned that a mail survey, similar to the instrument developed in Task 2, could be implemented by the Department of Higher Education to furnish data on the location of graduates in a sound, coordinated manner.

Sub-tasks (a) and (b) of this task, which constituted the short-run goals of this portion of the project were not successfully completed. As detailed in the task narrative below, a survey of the data collection activities of New Jersy colleges was not successful in obtaining usable data on the retention of health professions graduates. However, sub-tasks (b) and (d) were somewhat more successful in that a post-graduation survey was launched by the Department to collect this kind of data. The results of this survey activity will furnish data which can be used to check current assumptions on retention rates of health professions graduates.

2. CURRENT ASSUMPTIONS CONCERNING THE IN-STATE RETENTION OF HEALTH PROFESSIONS GRADUATES

In order to estimate the impact on health manpower supply of increasing enrollments in health professions education programs, and to estimate the impact of new programs the Health Professions Education Master Plan utilized the concept of "in-state-survival factors" or "retention rates".(1) In-state survival factors were estimated for each health manpower category, based on the general rule that greater mobility is characteristic of more extensively trained graduates of health professions programs. The following assumptions were made with regard to the proportions of health professions program graduates who will remain in New Jersey:

- Two years or less of training = .80
- More than two through four years of training = .65
- Five years or more of training = .50

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(1) Health Professions Education Master Plan, p. 90.

The numerical value of the survival factor or retention rate gives some insight into evaluating the costs and benefits to the State of proposed and existing health professions programs. Each retention rate assumes that the State must always produce a graduate output that exceeds its manpower needs. For the most part, in the absence of real data to verify the retention rates, the assumptions first made in the Master Plan have been carried over within the current manpower supply projection methodology. The following retention rates are currently utilized:

Manpower Category	Retention Rate
- Physicians	.50
- Dentists	.50
- Dental Assistants	.80
- Dental Hygienists	.80
- Dental Lab Technicians	.80
- Nurses	.80
- Nurse Practitioners	.65 & .80*
- Physician Assistants	.65
- Optometrists	.50
- Pharmacists	.75**
- Veterinarians	.50
- Dieticians & Nutritionists	.50
- Cytotechnologists	.80
- Histologic Technicians	.80
- Medical Technologists	.65
- Medical Lab Technicians	.80
- Medical Lab Assistants	.80
- Medical Records Administrators	.65
- Medical Records Technicians	.80
- Radiologic Technicians	.80
- Nuclear Medicine Technologists	.65
- Occupational Therapists	.65
- Occupational Therapy Assistants	.80
- Physical Therapists	.65
- Respiratory Therapists	.80
- Respiratory Therapy Technicians	.80
- Speech Pathologists/Audiologists	.50

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* The .80 factor is used for diploma and associate degree programs. The .65 factor is used for baccalaureate degree nursing programs.

** A .75 factor was used which is higher than other categories with the same length of educational training. This factor was selected upon the advice of the pharamaceutical community within the State. It reflects the small entrepreneurial nature of much pharmacist employment, and their tendency to establish such businesses close to their place of residence and origin.

3. CURRENT POST-GRADUATION SURVEY PRACTICES AT NEW JERSEY COLLEGES AND UNIVERSITIES

At the same time that this project's staff began to investigate the question of the State's retention of graduates, the Department's Office of Planning and Research began to investigate the possibilities of assembling a system-wide data bank on the post-graduation pursuits of all New Jersey graduates. Therefore, we were able to work with the Office of Research to facilitate implementation of these sub-tasks.

In May, 1976 the Department surveyed institutional efforts to collect data on the activities of their graduates (Appendix III, Exhibit 1). The survey requested data on the nature of each institution's survey activity (e.g., intervals at which studies are conducted, validation of findings, etc.). A copy of the most recent survey instrument and a copy of the latest placement study publication was also solicited from each college. In brief, the following was found with regard to post-graduation survey practices:

a. All public institutions (which conduct the majority of health professions education programs), with the exception of Rutgers University, New Brunswick and two county colleges, conduct some kind of routine survey of post-graduation. They vary widely in the quality and sophistication of the survey instrument utilized and the survey administration procedures followed.

b. The intervals at which colleges surveyed their graduates were considered important in assessing the utility of institutional placement data in the construction of a reliable state-wide view on the retention of graduates in the State's work force. Placement or employment rates obtained from polling graduates three months after graduation will differ from rates resulting from surveys conducted after six months or a year. As Table IV, Exhibit 2, Appendix III indicates, New Jersey colleges survey their graduates at widely varying intervals. Table IV indicates that among the county colleges (which conduct the largest portion of health professions programs) at least ten separate survey administration intervals exist. Whereas, this finding in no way prevents institutional efforts to develop base line data for good institutional-level use, comparisons of these data on a state-level would be misleading.

c. In many cases the Department's survey revealed that institutions did not document placement rates by field of study, showing instead simple tabulations of numbers of students who attained jobs. This can create the illusion that a program's graduates have attained a significant level of success in finding employment when in fact the employment rate may be low.

d. Finally, an examination of institutional surveys and publications revealed that many studies did not include the question "Do you work in New Jersey?" Although a question on employment status was invariably included, in many cases, a question on location of employment was not. This reflects a difference in information priorities at the colleges. Whereas the fact that a student was successful in finding a job was important, where that student found employement was not. Many surveys, especially at the community college-level were designed for the most part to gauge graduates' satisfaction with the educational programs and services provided by the college.

Because of the great inconsistencies in the survey practices of New Jersey colleges, both the DHE Research Office and this project's staff concluded that existing data would not constitute a reliable picture of the retention rates of graduates in the State's work force. Instead it was decided to launch a state-wide post-graduation study to obtain sound information.

There were, however, two exceptions to this decision. It was found that the State's medical and dental schools, through their alumni offices kept on-going and reliable data on the location of their graduates. According to the College of Medicine and Dentistry of New Jersey approximately 50% of its medical school graduates have remained within the State to practice; agreeing with the retention rate of 50% assumed by the projection methodology. A 50% retention rate was also adopted for dentists. The New Jersey Dental School has reported an average retention rate of approximately 60% over the past 10 years. Fairleigh Dickinson University School of Dentistry which graduates half of all dentists educated within the State reported a 47% retention rate. This indicates that the overall assumption currently used (50%) has not been far off the mark.

4. SYSTEM-WIDE POST-GRADUATION STUDY PROPOSAL

a. Methodology

When it was found that existing data collected by New Jersey colleges could not be utilized to present a state-wide view of the post-graduation activities of New Jersey graduates, the Department proposed a State-level, longitudinal study of the spring graduates of all higher education programs. A proposal describing such a study was forwarded to the presidents of all New Jersey colleges in February 1977 (See Exhibits, Appendix III).

The original proposal suggested the following methodology for developing a system-wide data base on the State's college graduates:

(1) It was proposed that an on-going mechanism be developed within the Department to survey a sample of Spring graduates of the State's public and private institutions every other year. This study would be longitudinal in nature with the first follow-up conducted one year after graduation and the second survey four years later. It was planned that the study would commence with the survey of Spring 1976 graduates.

(2) It was proposed that an advisory committee made up of representatives of each institution be constituted. This advisory committee would be charged with: (a) collaborating with department staff to develop a suitable survey instrument responsive to institutional and Departmental data needs; (b) developing protocols between the institutions and the Department to govern survey administration, and, (c) to obtain the cooperation of all institutions in this effort.

(3) Departmental staff would develop a state-wide report on the educational and employment outcomes of New Jersey programs with the advice of the advisory group.

(4) It was further proposed that the Department would finance at least this first wave of surveys, process the data and make the resulting data files available to each institution.

This project's staff worked closely with the Office of Planning and Research and the advisory committee to insure that specific data needs with regard to health professions graduates were fulfilled.

The advisory committee and staff worked through the summer to develop a survey instrument and protocols for the administration of the survey. A copy of the final draft of the questionnaire appears as Exhibit 4, in Appendix III. Included within this survey were general questions on the nature of employment and further educational pursuits of graduates and specific questions for the holders of health professions degrees. These questions related to State licensure and professional accreditation and work settings of those health professions graduates currently employed in the health care field.

Project staff also developed major field classification codes for health professions education programs based upon the federal Higher Education General Information System Taxonomy of degree programs. (The HEGIS taxonomy is currently used by all U.S. colleges and universities to fulfill federal data requirements.) This coding scheme was utilized to identify degree levels and major fields of study for health professions (and other) graduates so that the resulting survey data could be analyzed by field and degree level. This taxonomy appears as Exhibit 5 and 6 in Appendix III.

b. Problems in Implementation

From the onset of this activity staff was aware that the success of the proposal depended upon the cooperation of the State's colleges and universities in this initial endeavor. If the first post-graduation study was successful it would provide a basis for the development of a statewide system for the regular collection and compilation of data on graduated students.

However, many institutions were reluctant to forego their own post-graduation survey to cooperate with the Departmental efforts. There were two reasons for this reluctance. First, the institutions with sound and sophisticated post-graduation survey capabilities did not wish to relinquish their prerogative even for one year. Other institutions were reluctant to have the educational outcomes of their degree programs as described by the survey data compared to those of other institutions and made available to the public at large.

Only 22 of the 45 institutions in question chose to participate in the mail survey conducted by the Department. These institutions provided the Department with 1976 graduates' names and addresses, major field of study and degree received in preparation for the Department's mail survey.

In order to collect at least some basic data on the location and status of graduates of the 23 non-participating institutions, the Department with the help of the advisory committee negotiated another option. These institutions agreed to report data on employment status and location of their May-August 1976 data through their own institutional surveys in a format specified by the Department. Each institution was asked to complete a questionnaire to describe the nature of their 1977 survey activity and furnish the Department with data on the employment of occupational program graduates. A copy of this questionnaire appears as Exhibit 7 (Appendix III).

c. Results

Although only 22 of the 45 institutions participated in the mail survey, the study's population included 12,500 1976 graduates. This constituted the largest State-financed data collection effort carried out by the Department to date. The first mail survey was done in mid-September 1977, and three follow-up mailings were conducted at three-week intervals after the first mailing. The collection of base data from non-participating institutions was completed in early Spring 1978.

The Department's mail survey was extremely successful in that a very high response rate -- over 70% -- was attained and the completed questionnaires were of good quality. The resulting survey data has been assembled, edited and stored on tape. It has only recently been made available to Department and institutional staff. This file will furnish at least some basis upon which to compare current assumptions about State retention of health professions graduates. The base data on employment of graduates furnished by non-participating institutions will also be used to run a validity check on current assumptions. However, the reliability of this data is questionable.

d. Conclusion

It was hoped that the Department's survey activity could be used as a basis for the establishment of a system for the regular collection and compilation of basic data on graduated students' activities. However, the Department's experience suggests that a centralized mechanism may not win the necessary cooperation of all or even a majority of higher education institutions. A decentralized protocol that would allow colleges to collect their own data would seem to have a much better chance of success, at least in New Jersey.

However, in order to aggregate data collected in this manner for a reliable state-wide view, institutions must be pursuaded to adopt a uniform survey instrument or at least include a uniform core of questions in their individual questionnaires and adopt uniform survey procedures (e.g., survey graduates at same interval after graduation). A post-graduation survey advisory committee, made up of placement officials and/or institutional researchers from every involved college and university can be utilized to coordinate such a data collection effort. A survey instrument and procedures similar to the one developed in Task 2 could be adopted for this purpose.

D. TASK 4: Develop a Methodology to Implement a Series of Health Manpower Projections

1. STATUS OF THE TASK

The implementation of the health projections of supply and demand for health professionals in New Jersey was a continual task throughout the two year project period. Most of the requirements of the task have been completed satisfactorily. However, two elements of this task have not been fully completed. First, staff spent considerable effort in an attempt to develop a health status related projection model to be used in conjunction with the econometric model used for our health manpower projections. We were unsuccessful in developing a health status projection technique which was statistically significant. This effort will be documented in the subsequent discussion of this task. The second area which was not fully completed involves the development of HSA specific projections of manpower supply and demand. Due to data limitations, unique projecting equations for each of the State's five Health Systems Agencies could not be developed. However, we have been able to determine a means to develop manpower projections for each HSA based on the statewide projection equation. This technique will be presented in Section 6 of this task narrative.

In order to implement the health manpower projections, a number of steps must be taken. First, after compiling the baseline data, staff developed a series of projecting equations for the professions which were being studied. Three major techniques were used to generate these equations, two of which were based on stepwise regression techniques. The first, which concerned licensed health professions, developed a realtionship between the distribution of these professionals by county (21 observations) and demographic factors for each county, such as size, age, and income of the population. Nine separate equations were developed in this manner and were used to project the demand for twelve health professions. The second series of equations was developed for non-licensed health professions which are employed in health facilities, especially hospitals. These equations relate hospital service center (i.e., respiratory therapy) hous to institutional parameters such as non-payroll expense per bed, inpatient maintained beds, inpatient and outpatient visits, average length of stay, and service center average wages. These institutional equations were used for laboratory services, respiratory therapy services and medical records services. The final model used involved dental auxiliaries and used a ratio of auxiliaries to dentists as the projection factor. The completed projections and the models used to develop them were reported in a comprehensive report on the need for twenty-eight health professions in New Jersey through 1985 (Appendix IV).

With the completion of the quantitative elements of the projections, the second step of their implementation process was undertaken. This involved the creation of policy related recommendations premised in part on the results of the manpower projections. This activity is being met on two fronts. First, staff has drafted an extensive analysis of the current and future scope and cost of health professions education in the State in relation to the State's total involvement in higher education and levels of effort in other States. Using the projections as a base from which to analyze where programs should be encouraged to develop or should be discouraged, this analysis (Appendix V) will be used as a guide in future budgetary actions by the Board of Higher Education. On a second front, the results of the projections are being integrated with the health professions education policy recommendations developed during the Department's onging master planning activities. This integration will be completed when a comprehensive planning document is published in the coming months.

As part of the development and implementation of the health manpower projections two additional reports were developed during the contract period. The first report entitled "Analysis of the Need for Physicians in New Jersey 1975-1985", is attached to this final project report. This analysis was undertaken to determine the impact of the Health Professions Educational Assistance Act of 1976 (P.L. 94-484) on the future supply of physicians in New Jersey. New Jersey has had a historic dependence on Foreign Medical Graduates (FMGs) for a number of years. For example, in 1976, approximately three-quarters of the newly licensed physicians who entered practice in New Jersey were FMGs. Of these only 20% were American born FMGs. Further, over 60% of all New Jersey's physicians in residency programs were FMGs. Accordingly, the new legislation, which amends the Immigration and Nationality Act in a manner to severely restrict the entry of foreign-born FMGs into the United States, will have a substantial impact on New Jersey's ability to attract new physicians to residency programs and to practice in the State. The report finds that because the FMG physicians will no longer be able to enter the country to practice, New Jersey will be facing a situation by 1982 where the number of new practitioners will not be sufficient to replace those who leave the workforce because of death or retirement. This report is now being used by state level planners and a special gubernational commission in their efforts to confront this potential manpower crisis in an expedient manner. The second report developed during this contract is "An Inventory of Health Professions Education Porgrams in New Jersey." This document provides a full inventory of all post secondary mental health and health professions education programs in the State by county and health service area. It offers detailed information on clinical affiliations, entry requirements, program length, tuition charges, credential awarded, and annual enrollment and graduation levels. It is used not only by state and local planners, but by high school guidance counselors throughout New Jersey. This document is attached to this final comprehensive report.

The following narrative provides more detailed information on the sub-tasks required by the contract, including: alternative projection models; levels of confidence for projections; implementation recommendations for projections; methods of transformation of statewide projections to HSA levels; and, a general method for developing econometric projections of health manpower needs.

2. PRESENTATION OF PROJECTION RESULTS

After developing its set of health manpower projections, staff produced a comprehensive report documenting these results. Entitled "An Analysis of the Need for Health Professionals in New Jersey 1975-1985," this document is provided in Appendix III. The report provides the projection results for twenty-eight health professions, as follows:

1. Physicians
2. Dentists
3. Dental Hygienists
4. Dental Assistants
5. Dental Laboratory Technicians
6. Nurses
7. Nurse Practitioners
8. Physician's Assistants
9. Optometrists
10. Pharmacists
11. Veterinarians
12. Dietitians
13. Nutritionists
14. Cytotechnologists
15. Histologic Technicians
16. Medical Technologists
17. Medical Laboratory Technicians
18. Medical Laboratory Assistants
19. Medical Records Administrators
20. Medical Records Technicians
21. Radiologic Technicians
22. Nuclear Medicine Technologists
23. Occupational Therapists
24. Occupational Therapy Assistants
25. Physical Therapists
26. Respiratory Therapists
27. Respiratory Therapy Technicians
28. Speech Pathologists/Audiologists

The quantitative results of the projections are provided in narrative, tabular, and graphical forms. Projections of supply of each profession for 1975, 1980 and 1985 are compared to the demand projections for 1980 and 1985. Through this comparison, the determination of manpower need either as a projected surplus or a shortage is made. Such shortages or surpluses are described as percentages of supply for 1980 and 1985 in the report narrative section. The data are then displayed in tables which show 1975, 1980, and 1985 supply, demand and manpower need. Demand is provided as a midpoint estimate plus or minus a confidence band calculated at a 95% confidence level. Manpower need is calculated from the midpoint of the demand projection. Finally, supply and demand are provided on a graph. On the graph, the plotting of supply and demand provides the strategy lines for each profession. Using these strategy lines, appropriate points of intervention can be determined for recommended actions to prevent either the shortage or surplus situation.

With the publication of the appended report, the requirements of sub-task (a) are met.

3. ALTERNATIVE PROJECTION MODELS

It should be realized that projecting the supply and demand for any health occupation is not an exact science. Manpower forecasting models, like other statistical measures and estimates, attempt to provide answers to particular questions. There are, therefore, many varieties of forecasts obtainable by many techniques. To the extent that all models are based on a number of assumptions either as to the stability of the relationships of the variables that make up the model, or as to the way in which the variables are expected to change in the future, it is not surprising to find that different models yield different projections. This does not imply that projections should not be used, but it does suggest that before the projections are accepted, the assumptions of the model should be fully stated. While it is obvious that we are suggesting that one should use manpower projection models with caution, these models do provide the decision maker with a useful tool to assist in the development of policy. Modeling and forecasting provide a logical and rigorous means for gaining insight into the future and offer the policy maker an opportunity to explore the implications of policy before it is put into effect.

Four major projection models were developed for New Jersey, one for licensed professions, a second for dental auxiliaries, a third for non-licensed professions, and a theoretical model for nurse practitioners (NPs) and physician's assistants (PAs). These models were all developed using 1975 data. The sources for these data are explained in the general projection metholodology outlined in Section 7 of this task narrative.

The first demand model used in the manpower projections for New Jersey is the licensed health professions model. Briefly, this model is based on a single regression equation which relates professional distribution by county to a number of independent variables such as permanent income, median age, population size, hospital service utilization, school enrollments, and percent aged. There were nine unique equations used for these projections involving the licensed health professions. Each of these equations was developed using stepwise regression techniques. To exemplify their statistical basis, the following narrative documents the physician demand projection equation. The basis of this equation is identical to that of the other licensed professions' equations, however, the variables used and their coefficients vary.

The demand projection model used for physicians is defined by the following basic equation:

(1) $(\frac{P}{Pop}) = A \cdot Y_b^{B1} \cdot A_b^{B2} \cdot V_b^{B3} \cdot E$ where:

$(\frac{P}{Pop})$ = The physician to population ratio.

A = Constant term of the equation.

Y_b = Permanent family income by county in the base year.

A_b = Median average age by county for the base year population.

V_{hb} = Hospital visits by county for the base year population.

B_1 = Income elasticity coefficient.

B_2 = Age elasticity coefficient.

B_3 = Hospital visit elasticity coefficient.

E = A random error term representing all other variables that are likely to affect the demand for physicians but are excluded from the equation. By assumption, the average effect of all the excluded variables is zero.

This equation can be fitted to determine the unknown coefficients (B_1, B_2, etc.) by regression analysis once it has been transformed from an exponential realtionship to a linear form, which is accomplished by taking the logarithms of both sides of the equation. This yields:

(2) $\ln (\frac{P}{Pop})_b = \ln A + B_1 \ln Y_b + B_2 A_b + B_3 \ln V_{hb} + \ln E.$

From the mathematical definition of a linear equation, the coefficients B_1, B_2 etc. represent estimates of the slope of the regression line. For example:

$$B_1 = \frac{\Delta \ln (\frac{P}{Pop})_b}{\Delta \ln Y_b}$$

The change in the logarithm of a number is equal to its percentage change, therefore:

$$B_1 = \frac{\% \Delta \left(\frac{P}{Pop}\right)_b}{\% \Delta Y_b}$$

This is the mathematical definition of the income elasticity. Therefore, estimates of the slope coefficients of the model provide direct estimates of the elasticity for each variable.

By using regression analysis on equation (2), the following estimating equation is obtained:

$$(3) \quad \ln \left(\frac{P}{Pop}\right)_b = 6.902 + \underset{(2.767)}{.5910} \ln Y_b + \underset{(2.429)}{.9334} \ln A_b + \underset{(4.142)^*}{.4935} \ln V_{hb} \qquad r^2 = .780$$

Once the basic estimating equation is obtained, an adjustment to the data is needed to calculate the current statewide imbalance between supply and demand. This is done by increasing the current number of physicians by the estimate of current unmet needs. This equation is defined by the following:

$$(4) \quad \left(\frac{P}{Pop}\right)_{bu} = \left(\frac{P}{Pop}\right)_b \cdot (1+\hat{u}) \qquad \text{where:}$$

$\left(\frac{P}{Pop}\right)_{bu}$ = The population ratio in the base year adjusted for current unmet need.

$\left(\frac{P}{Pop}\right)_b$ = The physician to population ratio in the base year period.

$\hat{u}$ = A percentage estimate of current unmet need.

By using the results of equation (3), the percentage increase in demand resulting from increases in the independent variables (i.e., age, income, etc.), as well as increases in national health insurance and productivity, can be obtained from the following equation:

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*The sample size is 21 observations. One observation on each variable for each county in New Jersey. The numbers in parentheses represent t values or estimates of degrees of statistical significance. With 21 observations and 16 degrees of freedom, the coefficients of the equation are significant at the 2.5 level of significance if the value of t exceeds 2.1. In other words, we are confident that 95 times out of 100 that the computed coefficients of the equation are different from zero.

(5) $(\frac{P}{Pop})_t = .5910\ \dot{Y}_t + .9334\ \dot{A}_t + .4935\ \dot{V}_{ht} + \dot{I}_t - \dot{Q}_{ts}$ where:

$(\frac{P}{Pop})t$ = The percentage change in the physician to population ratio resulting from changes in the variables below.

$\dot{Y}_t$ = The percentage change in permanent income to time period t.

$\dot{A}_t$ = The percentage change in the age of the base year population to time period t.

$\dot{V}_{ht}$ = The percentage change in hospital services provided to time period t.

$\dot{I}_t$ = A projected estimate of the impact of national health insurance on the demand for physicians in time period t (1980-1985).

$\dot{Q}_{ts}$ = An estimate of productivity changes in the time period to 1980 and 1985.

The projected physician to population ratio is determined by applying the results of equation (5) to the following:

(6) $(\frac{P}{Pop})t = (\frac{P}{Pop})bu \cdot 1 + (\frac{\dot{P}}{Pop})t$ where:

$(\frac{P}{Pop})_t$ = The projected population ratio in time period t.

Finally, the number of physicians demanded by any time period is determined from the following:

(7) $P_t = (\frac{P}{Pop})_t \cdot Pop_t$ where:

P_t = The number of physicians demanded in time period t.

Pop_t = The projected population in time period t.

For the remaining eleven professions for which the licensed model was used, the calculation of futre demand is the same as shown above. For these professions, different equations were developed comparing county distribution to a number of variables. Therefore, the number of variables used in each and their coefficients vary across each equation.

The second model used for manpower projections is a ratio approach for dental auxiliaries. Dental auxiliaries are primarily employed in private practice settings. These professions include dental assistants, dental hygienists, and dental laboratory technicians. Unlike the majority of licensed professions, hard data on the utilization and distribution of these personnel are often not available on a county basis. Accordingly, a regression based model, similar to that used for the licensed professions, cannot be developed for dental auxiliaries. Rather, a projection technique directly related to the supply of dentists can be used to determine the future demand for these professionals.

The dental auxiliary model uses a simple ratio of auxiliaries to dentists to determine 1980 and 1985 demand. For New Jersey, five ratios were employed, two for dental assistants, two for hygienists, and one for laboratory technicians. The first ratios used for these professions are based on the 1975 supply of each to the supply of dentists. These data were developed from the licensure surveys of dentists and hygienists and the Occupation Employment Surveys of dental offices and laboratories. The second set of ratios is based on national counts of dentists, assistants, hygienists and laboratory technicians. Because the national ratios for assistantsand hygienists are higher than those for New Jersey, it was evident that New Jersey dentists did not utilize auxiliaries to the same extent as dentists did in other states. In order to estimate the impact on manpower resources if New Jersey dentists increased their utilization of these personnel, these national ratios were included in the projections for assistants and hygienists. To calculate future demand, the auxiliary-to-dentist ratios are merely multiplied by the 1980 and 1985 projected supply of dentists.

A third model to project manpower requirements was designed for institutional-based, *non-licensed health professionals* (i.e., laboratory technicians). Data to develop this model were drawn from the New Jersey Department of Health's Standard Hospital Accounting and Rate Evaluation (SHARE) system. These 1975 data concerned on all 106 reporting hospitals in the system. The individual hospital data used from the SHARE system included hospital type and ownership, certified inpatients, certified patient days, maintained beds and service section employment hours, salaries and units of services. Of the twenty-six service sections in the data base, five were studied in depth in an attempt to develop the equations. These service sections were dietary, laboratory, medical records, nuclear medicine, and respiratory therapy. Also, five data elements missing from the SHARE system were taken from the *AHA Guide to Hospitals*, including admissions, occupancy rates, total expenses, payroll expenses, and personnel. Using these data, it was possible to develop strong equations for three of the five service centers, laboratory, medical records and respiratory therapy. These equations were developed using the service center personnel hours as the dependent variable of the regression equation and data items such as inpatient admissions, emergency room visits, outpatient visits, average length of stay, certified inpatient days, certified maintained beds, non-payroll expense, and average service center wages as the independent variables.

The resulting equations are comparable to equation (5) in the previous discussion of the licensed professions methodology. For example, the final equation for laboratory services is:

$$\dot{HRS}_t = \underset{(12.9)}{1.026\,\dot{V}_t} + \underset{(3.6)}{.626\,\dot{ALOS}_t} + \underset{(3.4)}{.585\,\dot{EXP}_t} + \dot{I}_t - \dot{Q}_{ts} \quad \text{where:}$$

$\dot{HRS}_t$ = the percentage change in laboratory personnel hours resulting from changes in the variables below.

$\dot{V}_t$ = the percentage change in total visits (inpatient, emergency, and outpatient) to time period t.

$\dot{ALOS}_t$ = the percentage change in average length of stay to time period t.

$\dot{EXP}_t$ = the percentage change in non-payroll expenses per bed (total expense - payroll expenses divided by beds).

$\dot{I}_t$ = a projected estimate of the impact of national health insurance on the demand for medical services in time period t (1980-1985).

$\dot{Q}_{ts}$ = an estimate of the productivity changes in the time periods to 1980 and 1985.

The t-values are shown in parenthesis below each of the three independent variables. In each case, these values are above 1.96, which means that they are significant to the 95% confidence level. Similar equations for medical records and respiratory therapy were developed and are shown in the report in Appendix III.

Two other manpower models were studied which should be discussed. The first, which was begun prior to the contract award and completed during this first project year is a theoretical model involving physician extenders. Beginning in 1975, the Department undertook an eighteen month research project to determine the potential demand for and supply of nurse practitioners and physician's assistants in primary care practice settings in New Jersey. This analysis was documented in a 1977 report entitled, "A Study of the Potential Need for Nurse Practitioners in New Jersey."

Linear programming was used as the basis of the NP/PA model in order to measure the potential productivity gains incurred by the extensive use of both NPs and PAs. Data used in this model were provided by a survey of 2273 randomly selected New Jersey physicians in primary care specialties. The 547 physicians who responded to the survey provided information on current staffing configurations used in the production of twenty-four typical services which were estimated to account for over 70% of a physician's time. The survey also obtained the same specifications under a hypothetical practice situation in which there were no constraints on the hiring of NPs and PAs. For the hypothetical situation, physicians were asked to imagine a 10-20% increase in patient load and complete access to the health manpower labor market (i.e., if PAs who cannot practice in New Jersey, were available for employment in the State). The linear programming model identified the most efficient mode of production in the "current" practice setting and in the hypothetical situation. Productivity gains were calculated by comparing the amount and kinds of manpower required by each model to produce a given quantity of health services. The analysis found that if both NPs and PAs were efficiently utilized in the production of primary care services, New Jersey's private primary care practices would have the capacity to supply 40% more services to the public.

In this report, the manpower requirements needed to meet the needs in a hypothetical efficient system of office-based primary care are presented. Such a system would allow for the full employment of both NPs and PAs. In order to determine these requirements, a six step procedure was used, as follows:

1. A linear programming model selected the optional production methods (i.e., staffing configurations) for each of the twenty-four services. These production methods specified the number of minutes each manpower category (physician, RN, NP, etc.) should spend in the production of one unit of each service if the service was to be produced at least cost.

2. The weekly demand for each service was calculated by multiplying the estimated number of physician practices performing the service by the average number of times each service was delivered per week in an office setting.

3. The weekly requirement for each category was calculated by multiplying the average weekly demand for each service by the optimal number of minutes of professional time to produce one unit of service.

4. All twenty-four services' weekly minute requirements for each manpower category (step 3) were summed up to derive the total minutes of professional time required to meet weekly demand.

5. Using the estimate that the twenty-four services represent 72% of total primary care, the weekly minute requirements were adjusted to reflect the total (100%) demand for primary care and were translated into hours.

6. Finally, the weekly hour estimates were converted into full-time equivalents by using a 40 hour work week for both NPs and PAs.

Using the full-time equivalent data, health manpower demand for NPs and PAs were calculated for the hypothetical system in which these professions could be utilized by the primary care physician.

To determine the supply of nurse practitioners and physician's assistants, two methods were used. For NPs, data on current supply were provided by the Pediatric Nurse Practitioner Forum. Using this data as a base year count, future supply was calculated based on the output of New Jersey's NP programs through the projection period. Future supply of PAs was calculated from anticipated output from New Jersey's current program jointly run by CMDNJ and Livingston College of Rutgers University. Also, in-migration of PAs was estimated based on a survey of regional PA programs in neighboring states.

While this study was the first attempt by the Department to quantify the theoretical need for NPs and PAs in New Jersey, its linear programming technique, which is based on a task delegation analysis, is another useful model to determine potential manpower requirements.

The final manpower model which was addressed by the project was a health status model. Staff was not successful, however, in developing this alternative model. In attempting to develop the health status model, stepwise regression and factor analysis were used. The major problem with such modelling was that good data on health status and morbidity were not available. Therefore, we were compelled to use data and indicators which did not offer a full proxy of the health status of a population.

The goal of this modelling was to find significant predictors of hospital demand. During the stepwise regression runs, hospital utilization, displayed as patient days, inpatient admissions and total visits, was used as the dependent variable. As independent variables numerous items were tested including income, population, racial and ethnic distributions, per cent foreign born, infant mortality rates, death rates, and proportion of women of child bearing age. The only two variables which were significantly related during these regressions were beds and per cent foreign born in the population. Another technique, factor analysis, was used in place of the regression technique, however, results were also disappointing. We were not able to develop a usable model based on health status, and, until such a time when better data on morbidity become available, one can anticipate similar results.

While not all the models we hoped to develop were successfully developed, the four techniques outlined above are applicable to the manpower planning requirements in other jurisdictions.

4. CONFIDENCE LEVELS FOR MANPOWER PROJECTIONS

The techniques discussed in the previous section offer an intelligent means to look at the future. However, as noted in the opening remarks concerning these techniques, the accuracy of each is related to the assumptions and limitations of the model. This is especially true in those models which are developed using regressions, where correlation among independent variables in the model can effect its outcome.

Since the Department of Higher Education first began to develop manpower projections, there has been a need for a technique to assess the accuracy of our projections. A method has now been developed to determine the range of accuracy of the projections of demand. Specifically, this technique enables us to place upper and lower limits within which there is a 95% confidence that demand will fall. It is now used for the majority of the demand projections.

As described in the last section, many of the projections of demand for health professionals are based on the results of regression models. The coefficients of the regression equations represent estimates of the slope of the estimated regression line. Also, the slope of the independent variable is related to the dependent variable by the following equation:

$$(1)\quad B_j = \frac{\Delta \ln D_j}{\Delta \ln X_j} = \frac{\%\Delta D_j}{\%\Delta X_j} \qquad \text{where:}$$

B_j = the regression coefficient of the j^{th} independent variable

D_j = the logarithm of the demand for j^{th} occupation (i.e., nursing, dentistry, etc.)

X_j = the logarithm of the j^{th} independent variable (i.e., population, income, etc.)

It follows that the change in the logarithm (ln) of any number is equal to its percentage change. In addition, equation (1) is the mathematical definition of an elasticity and is interpreted as the percentage change in the dependent variable resulting from a percentage change in the independent variable.

The elements of equation (1) can be rearranged in order to project the relative or percentage change in the dependent variable, for projected changes in the independent variables. From equation (1), the following equation is derived:

$$(2) \quad D_j = \sum_{j=1}^{n} C_j B_j$$ where:

D_j = the relative change in the dependent variable (%ΔD_j) and

C_j = the relative change in the j^{th} independent variable (% ΔD_j).

It is possible to estimate a confidence interval around the projected values (i.e., growth rates) of the dependent variable. This calculation provides a low, midpoint and high estimate of demand at an assumed level of confidence (95%). In order to calculate the confidence interval, the mean (expected value) and variance of the D_j must be determined.

From equation (2), it was determined that the growth rate of demand for occupation j is a linear function of the growth rates of all the independent variables. The mean growth rate must also be a linear combination of the independent variables.

Thus, we have:

$$(3) \quad E(D_j) = C_j \, E(B_j)$$ where:

$E(D_j)$ = the expected (mean value of the growth rate in demand for occupation j,

$C_jE(B_j) = C_jB_j \cdot P(B_j)dB_j$ and

$P(B_j)dB_j$ = the probability distribution of the j^{th} regression coefficient.

By definition the variance around the mean projected growth rates $E(D_j)$ is defined as follows:

$$(4) \quad \sigma^2 \dot{D}_j = \int_{-\infty}^{+\infty} \left[\dot{D}_j - E(\dot{D}_j)\right]^2 \cdot P(\dot{D}_j)d\dot{D}_j$$

Substituting equation (2) and (3) into equation (4), we have:

$$(5) \quad \sigma^2 \dot{D}_j = \int_{-\infty}^{+\infty} \left[C_jB_j - C_jE(B_j)\right]^2 \cdot P(B_j)dB_j$$

Equation (5) indicates that the variance of the mean projection is a linear combination of the variances of the regression coefficients. This equation can be simplified by removing from the integral sign the weights (growth factors) which are constant from each regression coefficient. Therefore, equation (5) can be rewritten in the following manner:

(6) $\sigma^2 D_j = \sum_{j=1}^{n} C_j^2 \int_{-\infty}^{+\infty} \left[B_j - E(B_j) \right]^2 \cdot P(B_j)\, dB_j = \sum_{j=1}^{n} C_j^2 \sigma^2 B_j$ where:

$\sigma^2 B_j$ = the variance of the jth regression coefficient

Equation (6) is valid provided that the regression coefficients are independent of one another. If the coefficients are correlated, equation (6) takes the following form.

(6A) $\sigma^2_{D_j} = \sum_{j=1}^{n} C_j^2 \sigma_{B_j} + 2 \sum_{j=1}^{n} \sum_{k=j+1}^{n} C_j \cdot C_k \sigma_{B_j B_k}$ where:

$\sigma_{B_j B_k}$ = the covariance between the j^{th} and k^{th} regression coefficient.

Where the covariance in equation (6A) is equal to:*

(6B) $\sigma_{B_j B_k} = \dfrac{-\sigma_u^2 \Sigma x_j x_k}{\Sigma x_j^2 \Sigma x_k^2 - (\Sigma x_j \Sigma x_k)^2}$ where:

σ_u^2 = standard error of estimate of the regression line

Σx_j^2 = the sum of the squared values of the j^{th} variable measured in deviation from the mean of the j^{th} variable.

$\Sigma x_j x_k$ = the sum of the cross products measured in deviations from the mean of variable j and variable k.

Because we cannot assume that the coefficients used in the regression equation are independent, equation (6A) is used with equation (3) to allow for the calculation of the confidence interval around the projected mean demand growth rate. This is calculated using the following formula:

(7) $E(D_j) \pm t\alpha \left(\dfrac{\sigma_{\dot{D}_j}}{N} \right)$ where:

$t\alpha$ = the value of students t at a preselected level of confidence ($\alpha = .025$, two tailed or 95% Confidence Band)

$\sigma_{\dot{D}_j}$ = the standard error of the growth rate of the dependent variable calculated from equation (6)

N = the number of observations in the regression.

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* See Ralph E. Beals, Statistics for Economics: An Introduction, Rand McNally, Chicago, 1972, p. 273

As was discussed above, the best estimate of the expected value of the regression coefficient $E(B_j)$ is the computed regression parameter from a single sample (B_j). Therefore, in the equations presented above, B_j is used to estimate $E(B_j)$ and $D_j = E(D_j)$.

While the use of the confidence band for demand projections may add a level of complexity that some planners may not wish to have in their projections, it does correctly point to the fact that the projection is an educated guess of a future condition. As such, one should anticipate it to become less accurate as the time period of the projection increases. The confidence band calculation exhibits this increasing level of uncertainty within the parameters of the projection model. As such, it shows a flexibility which should enhance the acceptance of any series of projections.

5. STUDY OF THE FUTURE SCOPE AND COST OF HEALTH PROFESSIONS EDUCATION PROGRAMS IN NEW JERSEY

Using the results of the health manpower supply and demand projections as a base, staff analyzed and evaluated the current and anticipated direction, extent and objectives of the State's burgeoning health professions programs. This analysis was requested by the New Jersey Board of Higher Education's Finance Committee. It was designed to provide the Board with a rational framework within which it could make its short-run budget recommendations as well as future long-term policy determinations.

The Finance Committee's request was made in light of the fact that while other sectors of the State's higher education system are moving toward stable enrollments and fiscal needs, health professions education is still a growing portion of the higher education budget. The major questions posed by the study were:

a. Given the State's projected needs for various types of health professions what is the full range of programs development options for necessary existing programs and the implementation of new desirable programs? What are their benefits and costs in terms of manpower needs and State support?

b. Are there cost beneficial approaches which could be adopted to meet the educational and health manpower needs of the State?

The Department of Higher Education's role and responsibilities concerning the amount and quality of health care available to the public does not stop with the education of health professionals. Other responsibilities include: the direct provision of health care services in hospitals and clinics owned or affiliated with the various health professions programs, health care research conducted at higher education institutions; activities designed to correct the lack of proper representation of persons from disadvantaged and minority populations within the health professions, etc. However, it is essentially the first responsibility -- the education of sufficient numbers of high quality health professionals to meet the demands of a changing health care system -- which was the focus of this study.

The general methodology followed is a straightforward one. The results of the health manpower supply and demand projections were examined in order to determine current and anticipated needs for various types of health professionals. Then, available policy and/or program alternatives that the Department could or is currently implementing to meet these needs were evaluated in terms of their estimated impact on manpower needs and their costs to the public. These alternatives were prioritized in terms of manpower needs and cost effectiveness. The study concluded with recommendations on the courses of action to be taken for each manpower category. The costs of each strategy were aggregated to estimate the total future costs of health professions education activities and the impact of this cost on the future higher education budget.

The report is currently in its third working draft. Because of the length of the entire study, only a summary of the major findings and recommendations, as they currently stand are included in this report as Appendix V.

6. METHOD FOR TRANSFORMING STATEWIDE PROJECTIONS TO HSA LEVEL

With the development of a comprehensive report on the statewide supply and demand for health professionals through 1985, staff has begun to develop a means to adjust the projections to local health service area configurations. In New Jersey, there are five Health Systems Agencies representing the State's twenty-one counties. Because of the manner in which manpower data are collected in the State, only a portion of the twenty-eight professions studied can be analyzed at the local level using the projection techniques documented in this report. The actual transformation of our statewide projections results to local levels has not been attempted during the project period. However, the following narrative describes the techniques which will be used to make such transformations in the future.

As noted previously in this task discussion, projections of the demand for most health professionals are based on the results of multiple regressions in which the distribution of these professions is related to either demographic or institutional variables. For the licensed professions, the regression-based equations were developed from county level data. As such, these were developed using 21 observations, thereby providing results which had sixteen to eighteen degrees of freedom. The institution-based equations were developed using institutional data with the number of observations ranging from 80 to 106. Correspondingly, the degrees of freedom for these equations are much higher. As will be discussed later, supply data on the institution-based professions are largely unavailable by county. There is no reason, therefore, to convert the institution-based equations for demand to local area configuration as no corresponding local supply projection will be available. Accordingly, we are presenting a conversion method which will be implemented for the licensed professions only.

The number of counties in the five HSAs in New Jersey ranges from one to seven (there are also HSAs consisting of two, five and six counties). Since the licensed professions models are developed from county level data, it is not possible to develop a statistically sound demand equation for each HSA. It is possible, however, to use the statewide equation as a basis for local projections of manpower demand. There are six different independent variables used in the statewide demand quations, including population size, median age, percent aged, income, hospital visits, and school enrollments. Each of these data elements are available at the county level. By developing a time series for each variable, by the HSA county configuration, it is possible to determine projected growth trends for each planning area. These growth trends can be integrated into the statewide equation to calculate anticipated changes in demand by HSA area. These demand calculations can be aggregated to allow for comparison with the statewide projections of demand for each profession. A similar technique can be applied to the institutional models developed for the non-licensed health professions.

For projections of supply, only the projections concerning the licensed health professions can be readily transformed to HSA boundaries. For the non-licensed health professions there are no sub-state level data collected in New Jersey on their employment. In fact, to develop the non-licensed, institutional demand models, hospital service center hours (i.e., laboratory hours) were used as proxies for profession-specific involvement in each institution. To date, no profession-specific counts in our facilities are available. Accordingly, the technique outlined below cannot be used for the non-licensed professions.

Biennially, health professionals in New Jersey are required to renew their licenses. Since 1973, these license renewals, as will as new license issuances, have included health manpower information questionnaires. We can, therefore, develop a six year time series which shows the growth in supply for each licensed health profession by county. By aggregating these data by HSA and comparing total growth in statewide supply to these local growth trends, a weighted growth factor for each planning area can be determined. These weighted growth factors can be used to divide up the projected statewide growth in supply for each profession by HSA area, thereby creating local supply projections based on past supply rates.

As noted, these techniques have not been applied to our manpower projections during this contract. It is envisioned that the development of local projections of health manpower requirements is one of the next major steps to be taken in the implementation of our projections. Such local projections will be required not only for the major health professions, but for the numerous allied health professions which are educated in community college settings.

7. GENERAL METHOD FOR DEVELOPMENT OF ECONOMETRIC PROJECTIONS FOR HEALTH MANPOWER NEEDS

The past six sections have presented the method of health manpower projection implementation used by New Jersey during this two year contract. Briefly, this method has entailed the development of projection models and the explanation and presentation of projection results. There was little need in this process for data development since New Jersey had created a health manpower data base from surveys undertaken in 1974 and 1975. However, in other jurisdictions, the availability of useful data on health professionals, as well as supporting data necessary to develop projection models, may be minimal at a planning agency. Accordingly, it is appropriate to present a general three step model for developing health manpower projections which includes a data collection element.

Step 1: Data Development

There are two types of data sets which must be developed in order to create health manpower projections. The first set of data should provide specific information on the current health professional workforce in the geographic area to be studied. The second set includes all data on the consuming population, the delivery system, and the educational sector producing health professionals. Depending on the scale of the projection area (i.e., state, planning area, county), the ease in which these data sets can be created varies. The simplest area for projections is the states, as the levels of aggregation for data are larger. Also, many data sources are only available in statewide formats rather than by county, SMSA, etc. Further, the statistical validity of statewide modeling is usually stronger due to the greater number of observations available to create a model. For more localized planning, the problems of manpower mobility, migration and retention also increase as the geographic scale of the manpower model becomes smaller. This is not to say that local models are not valid, but that their limitations are usually greater.

To develop the first set of data needed to create projections of health manpower requirements, a number of potential sources are available. For licensed health professionals, state level licensing boards can provide aggregate counts and some distributional information. However, care should be taken to determine how the state level board develops its distributional information. That is, whether or not the board uses general mailing addresses or practice addresses to describe the location of its licensees. The licensing board can also provide time series data on the numbers of new licentiates who have received state licenses through examination or endorsement. These data are most useful in developing the projections of future supply. Many states are also involved in the Cooperative Health Statistics System and have manpower contracts to survey licensed health professions. Certain other states, including New Jersey, also carry out health manpower surveys in formats similar to the CHSS minimum data set. Such states can provide the descriptive and distributional information needed to create health manpower projections for the licensed professions.

For the non-licensed professions, data are much more scarce. As noted in the Task 1 narrative of this report, these sources of manpower data are available in most states from federally supported data collection activities. These include the NCHS Survey of Hospital Manpower, the U.S. Department of Labor Occupational Employment Surveys, and health facilities component surveys of the Cooperative Health Statistics System. Each of these sources can provide statewide counts of non-licensed health professionals working in institutional (NCHS, CHSS Surveys) and private practice (OES survey) settings. In order to gain distributional information not available from these sources, it may be necessary to mount a primary data collection effort. Such a data collection activity should be developed using employment surveys which will provide full and part-time counts of health professionals in each setting. In some cases (i.e., occupational or geographic mobility studies), it may be necessary to survey individual professionals. This can be accomplished through either the employing institution or professional association or societies. A method for such data collection is described in the Task 1 narrative.

Once baseline manpower are collected, the second step of the data development stage occurs; which involves demographic data, utilization data, and educational data. At a minimum, (i.e., for professional to population ratios), information on the size of the population by county, planning or other geographic area is required. Such data are available from the U.S. Census. For base years further into the decade, other population data sources are available including county, regional, and state planning agencies, as well as state departments of labor or economic security. Most manpower projections will require more detailed information, including data on age, sex, and race. These data are also available from the above noted sources. Income data by geographic area are needed for many models. Such data are available from the sources above, as well as a number of other sources including the Sales Management publications, which offer up-to-date data series on income. A final data need involves workforce attrition rates for health professionals. These rates are important in creating projections of future supply. A Department of Labor, BLS publication, Tomorrows Manpower Needs, Supplement #4, Estimating Occupational Separations from the Labor Force for States (1974), provides state level current and projected attrition rates by profession for seventeen health professions and groupings of professions.

Data on the utilization of health services are available from state facilities plans, reports on third party payments and from numerous American Hospital Association reports including the Annual Reports and the AHA Guide to the Health Care Field. Using these sources, it is possible to develop trends of service utilization at any geographic scale. Utilization data for private practitioners, most notably dentists, podiatrists, and veterinarians are more difficult to acquire. The most effective manner to get these data, other than through primary data collection, is by referring to their professional associations and publications. Often, specialized studies of their professional settings are available on local, statewide, or regional bases, which can be used for comparison to national utilization rates. Finally, educational output data are necessary to determine anticipated growth in the health professional supply from regional programs. These data are available from state higher education authorities which can provide graduate data from the Higher Education General Information System (HEGIS). A number of states also survey all post secondary programs to supplement HEGIS data. Once these output data are available, it is possible to develop manpower projections with a number of models.

Step 2: Model Development and Presentation

Health manpower projections are a means to determine whether or not educational, licensure, and other policies should be altered, replaced or developed to avoid severe manpower situations. As such, they can be used as one means to determine what changes, if any, should be made in the current educational, regulatory, or delivery systems. In order to determine whether change is warranted, the planner may choose to project for the short run how the system will operate. This kind of projection is recommended even though it is both limited and conservative in nature. In short run projections, substantial changes in the system are usually not factored in. Nor do such projections dramatically state what "should be" rather than what probably will be, although certain policy changes may be included in the projections. Therefore, the models briefly described below are seen as pragmatic ones for use in assisting policy and decision makers, rather than goal oriented theoretical models.

There are two elements to manpower modeling which, when compared, indicate anticipated levels of balance in the future educational and delivery systems. First, the future supply of health professionals expected to be practicing in a given geographical area must be determined. This is compared to the future demand for such professionals based on changes in population and the delivery system. When supply is greater than demand, a projected surplus of professionals is anticipated. This means that output from a state's educational programs in a given profession, coupled with in-migration, is more than sufficient to meet future manpower needs. In cases where demand exceeds supply, a shortage of professionals is projected. Shortages point to the need for increasing educational program enrollments, developing new educational programs, and/or altering the delivery system structure (i.e., by promoting service delivery by extender personnel). Another major use of manpower models is to allow for comparison of professional availability between or among geographic areas. The ratio approach is most frequently used in this manner.

One half of the task of developing health manpower projections involves the creation of estimates of future supply. To do so, the planner must first determine the current, or baseline, supply of a given profession. Using this count, annual changes in total supply can be calculated. First, attrition from the workforce is determined by multiplying supply by the professional separation rate. Then, additions to the workforce are factored in. If the health profession is licensed, these annual additions can be developed from licensing board data which must be adjusted by the proportion of new licentiates who actually work in the state and their distribution on a full time and part-time basis (full-time equivalency). For non-licensed professions additions to the workforce are calculated from educational output data adjusted for in-state retention and net in-migration. In-migration data are difficult to develop for non-licensed professions. For some certified/registered professions, past national registry changes can be studied in comparison with educational data to develop estimates of annual in-migration. The anticipated attrition level is subtracted from the expected additions to get a net annual change which is added to the supply count. This provides a projection of supply one year after the base year which can then be used to calculate supply for the next year, etc., until the desired five or ten year projection is completed.

The projection of future demand can be calculated using a number of alternative models, each of which were described in detail in the task narrative. Briefly, these include a ratio approach, an econometric model, and an institutional demand model. The ratio approach is often used in the projection of demand for assisting and auxiliary personnel. The ratio approach looks at the current (or a desired) ratio of practitioners to personnel and uses this ratio to calculate future demand. For example, if the current ratio of dentists to dental hygienists was 5 to 1 and one wanted to maintain this ratio, future demand for hygienists would be calculated using the projected supply of dentists. Thus, if the 1980 supply of dentists was projected at 5,000, the demand for hygienists would be 1,000. The advantage of the ratio approach is its minimal data requirements and its simplicity.

Econometric models for demand are based on the relationship between the utilization of health professionals and characteristics of the population. Their demand equations are developed from multiple or stepwise regressions in which the profession is dependent variable and the independent variables include income, population size, age, race, school enrollments, and other demographic factors. By developing these equations in a logarithmic form, the regression coefficients of the independent variables are considered as elasticities. By multiplying these coefficients by their respective percentage change and totaling the result, the anticipated percentage change in demand for a given health profession is determined. To calculate future demand, this percentage change should be multiplied by the base year demand for the professional which is the base year supply adjusted for unmet need in the base year. The statistical basis of this model is fully documented in the Task 4 narrative.

The institutional demand approach is also developed using regression results. In this case, the dependent variable is either the number of employees in a given profession or their total employment hours. The independent variables are institutional parameters such as inpatient beds, visits, capital expense, beds, length of stay, etc. As with the econometric model, once a sound equation is developed (i.e., one which has a high coefficient of determination and significant t-values for each variable), future demand is calculated using projected percentage changes in the independent variables.

Step 3: Presentation of Results

Once the projections of supply and demand are calculated, a presentation of their resulting comparison is needed. Such a presentation should include the supply and demand figures for the base years and projection years, as well as the anticipated shortage or surplus resulting from these calculations. These data can be shown in a simple tabular format. Also, they may be shown on a graph which plots both supply and demand through the projection period. The advantage of such a graph is that the lines of supply and demand act as strategy points where they intersect, thereby indicating the probable timing of an impending shortage or surplus situation. These timing points can be used to guide the scheduling of policy decisions related to manipulation of supply such as the starting new educational programs or controlling growth in existent programs.

If the projection results are to be used for educational planning purposes, another data item should be included in the presentation. In those situations when a shortage of health professionals is projected, it may be desirable to express this shortage in terms of required graduate output. For example, in New Jersey, approximately one out of every two physicians educated in the state eventually sets up practice within its boundaries. Therefore, the in-state survival rate for physicians is .50. As discussed in Task 3, a series of in-state survival rates for other health professions graduates in New Jersey has been developed. These rates range from .50 for graduate level professionals to .85 for graduates of two year programs. Applying the in-state survival rate for physicians (.50) would result in changing a projected shortage of 1,000 physicians to a required additional graduates output of 2,000 physicians. By studying shortages presented in such a manner, the educational decision maker can easily determine the potential impact of program plans on manpower shortage situations.

With the successful completion of the three step procedure, only one area of implementation remains, that is the translation of those projections into policy recommendations. While the task discussed here has dealt predominately with the technical aspects of health manpower planning, it is important to recognize that the development of such projections is not an end within itself. These data should be used in an ongoing manner to guide policy makers not only from the educational sector, but from the regulatory sectors as well. As such, the uses of projection results are evident. At a minimum, these include recommendations concerning expansion or curtailment of educational programs and the identification of areas of underservice and overservice. Once the basic modeling techniques described here have been mastered, more intricate manpower planning models can be undertaken. The most important of these is the analysis of how health services are currently delivered and how they might be delivered with different levels of manpower input in new types of settings and in a least cost manner. By using task analysis method and simulation techniques, these types of questions can be answered.

E. TASK 5 - Develop a Methodology for Periodic Assessment and Adjustment of Health Manpower Projections in a State

1. STATUS OF THE TASK

With the creation of series of ten year health manpower projections to guide educational policy makers, the task of implementation of health manpower projections is not completed. The development of projections should not be envisioned as a one time responsibility, but rather as an ongoing activity. Without such an orientation, manpower projections can become inflexible and increasingly inadequate as time passes. What is needed, therefore, is a capacity to monitor the accuracy of health manpower projections on a periodic, timely basis. Verification of manpower projections can be accomplished through continual monitoring of changes in the projection's data based and by development of methods for quick readings of current labor market conditions. Such methods were developed during this project period.

Task 5 was addressed primarily during the second project year. In a manner similar to the other project tasks, its implementation was focused on applying the sub-tasks directly to the system in New Jersey. Also, by taking the results of this direct application, a generalized plan for similar verification of health manpower projections in other jurdictions was developed. The sub-tasks of this project task have been successfully completed. That is, a mechanism to assess the current labor market conditions for selected health occupations has been developed and fully tested. Also, plans and protocols have been completed to ensure that population, economic, and manpower data are continuously provided for assessment and updates of the projections. Finally, a general plan for coordination among the SHPDA, SHCC, and HSAs for continous data flow and analysis is provided.

2. THE NEED FOR METHODS TO ASSESS MANPOWER PROJECTIONS

The creation of health manpower projections is a time consuming task. Due to the lag times which exist in the development of annual manpower, economic and demographic data, the base year for projection models is usually one to three years behind the calendar year in which they are developed. For example, in New Jersey, population data for the state and its counties are reported on a provisional basis six months after the end of the calendar year. Official state population figures are not released until eighteen months after the end of a chosen year. Manpower data have had a longer lag time with some survey reports not being released until two years after the initial manpower survey mailing. For these reasons, the only base year available in New Jersey which offered all requisite data elements for the development of health manpower projections was the 1975 calendar year. This means that New Jersey's manpower projections were released at point halfway through the first five years of the ten year projection period.

Because of all the demands present in developing projections and having then endorsed, some planners choose to stop any further analysis or model refinement until a time near the end of the projection period. A decision of this sort is not desirable nor is it necessary, since low cost methods are available to continually or periodically check the validity of any set of projections.

There are three elements to the verification procedure for health manpower projections. On the most basic level, one should be able to keep a running record of data updates for the variables used in a series of projections. In order to keep such a record, data provision protocols must be made with the data providing agencies. For example, in the New Jersey health manpower projections for physicians, four major variables are used to calculate the future demand for these professionals. The variables are population, income, median age, and hospital visits. Each of the variables is expected to change a given percentage through the projection period. Their approximate percentage changes are as follows: population @ 1% per year*; income @ 2% per year; median age @ .3% per year; and hospital visits @ 3% per year. By using population as an example, a simple matrix is shown below which provides the annual projections of population throughout the projection period and compares it to the actual observed population size.

Year	Projected Population	Actual Population**	
		Size	5 year % change
1975	7,414,700	7,414,700	
1976	7,487,810	7,451,770	.5%
1977	7,561,640	7,489,030	
1978	7,636,200	7,526,480	
1979	7,711,490	7,546,110	
1980	7,780,250	7,601,930	2.5%
1981	7,830,820	↓	
1982	7,881,720		
1983	7,932,950		
1984	7,984,520		
1985	8,032,070	7,793,890	5.1%

** These figures are hypothetical

If the observation year was 1981 and the last data point for actual population was 1980, it would be possible to compare the actual five year percentage change with the projected data used in the model. For the model's projected population, a 4.9% growth rate was anticipated to 1980, while the actual growth rate (based on the hypothetical data) would be found to be 2.5%. If this later rate were put back into the physician projection equation, the projection of demand for physicians would decrease from 13,770 to a new level of 13,460. Therefore, a change in demand 300 fewer physicians in 1980 would be caused by a change in just one of the model's five variables. If the trend resulting from the actual changes in population was used to project 1985 population and the resultant 1975-1985 percentage change was used to calculate 1985 demand, its projected value would decrease by 500 physicians from the original projections. It should be evident, therefore, that each projection variable should be monitored for comparison against its projected value, and that substantial changes in the manpower projections can result from changes in these variables.

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*Actually, population changes are projected on a five year basis, with a 4.93% increase projected from 1975 to 1980 and a 8.33% increase from 1975 to 1985.

It is recommended that any agency which develops manpower projects should engage in a data verification procedure similar to the one outlined above. In order to acquire necessary data on a continual basis, a plan for provision of such data should be devised. This plan need not be an elaborate one, but rather it should be a simple arrangement with relevant agencies for provision of data as data are updated. For example, the New Jersey project has been placed on the publication distribution list for those state agencies which are responsible for population, demographic and income reports. As these reports and data provided from other agencies (i.e., hospital utilization data) are received, the necessary data elements are pulled out and integrated into an updated data base. The mere provision of these data enables us to assess the scale of potential changes in projected demand.

The second element of the verification procedure involves changes in supply through the projection period. In order to develop a capacity to moniter changes in manpower supply over time, a plan for the continual provision of manpower data is required. As in the case with the demand variables, such provision should be attempted in the most simple manner possible. For the licensed professions, there are two major sources of data which should be used to provide basic manpower data. The first is the state agency which is responsible for the collection and analysis of data taken from the licensure process. Such data are usually collected by CHSS contract agencies or by SHPDAs and state departments of health which run their own manpower surveys. As these data are collected and processed, the specific data needs should be communicated to the agency developing the data reports. At a minimum, requests should include distribution for the state, planning area and county of each profession by employment status (full-time, inactive, etc.) and specialty, if applicable. The second source of data is the licensing authority, which should provide information on new licentiates for each profession on annual basis. Attempts should be made to have the licensing authority release these data by geographic area with estimates of the proportion of new licentiates who actually are expected to practicing therein. The aggregation of the two data sets allows for the development of a comparison of projected supply with actual supply. This enables the verification of the supply projection. In those cases where the supply projections are significantly different during the verification, the effect of the newer data should be considered in the calculation of manpower need (supply-demand). A similar comparison can be effected for those non-licensed health professions for which manpower data are periodically available. However, for most of these professions, data are scarce and a data data collection effort to update old supply data is usually required.

The third element of verification involves the assessment of whether or not the projected interplay between supply and demand is as expected at any given point in the projection period. This process is detailed in the section below.

3. QUICK READINGS OF THE MANPOWER MARKET

Another method to validate a series of health manpower projections is the sampling health service providers to determine current unmet needs. When the original projections are a graphed, the future trends supply and demand act as strategy lines. These lines can be used to show how these two factors compare at any point during the projection period. When it becomes inportant to test more than the statistical reliability of a model, it is possible to survey health employers to ascertain whether or not a projected shortage or surplus resulting from a comparison of supply versus demand is actually occurring in the labor market. By requesting data on current employment opportunities existing in a geographic area, the existing level of manpower shortage can be gauged.

The first step in developing a labor market survey is the identification of employment sites. Generally speaking, there are eighteen major employment settings for health professionals. These are:

- Blood Banks
- Colleges and Universities
- Dental Laboratories
- Dentists' Offices
- Drug Treatment Centers
- Health Maintenance Organizations
- Home Health Agencies
- Hospitals
- Neighborhood Health Centers
- Nursing Homes
- Medical Laboratories
- Non-profit Agencies

- Outpatient Clinics
- Pharmaceutical Firms and Pharmacies
- Physicians' Offices
- Public Health Departments
- Rehabilitation Center
- School Districts

The relevance of each of these employment settings changes depending on what health profession is chosen for analysis. For example, if medical technologists were chosen, the employment settings to be concerned with would be blood banks, colleges and universities, health maintenance organizations, hospitals, medical laboratories, pharmaceutical firms, physicians offices, and public health departments.

It should be evident that if the market for medical technologists were chosen to be studied, it would be difficult to do so in an expeditious manner. Therefore, it is helpful to select the major employment settings for these personnel so as to survey a majority of the market with a minimal survey effort. In this case, the sites which would probably include 80% of the medical technologists employed in a given area would include colleges and universities (especially medical schools and research oriented institutions), hospitals, and medical laboratories. In many jurisdictions, colleges and universities can be excluded without a substantial effect on the proportion of the market which would be covered. A second element of the selection of sites for surveys is the determinination of what proportion of each selected institutional category should be included in the survey. For local or planning area level verifications, it is recommended that all institutions within a chosen category be selected for surveying. At a statewide level, a sampling plan may be more desirable. Stratification should be based on size and location of an institution. For example, for hospitals the prime determinant should be either number of beds or annual visits. Those hospitals which are the largest should all be surveyed. As the size of the hospital decreases, the proportion of hospitals should decrease, ending at a survey level not smaller than one in four. Of course, in situations where more time is available for labor market readings across a state, sampling should be replaced with full population surveys for major employers.

Once the employment settings have been selected, the survey instrument can be designed. Recognizing that a goal of the market survey is for it to be quickly administered. The most expeditious means to run the survey is by using a telephone rather than an on-site interview or a mailed questionnaire. The telephone survey should be brief and succinct. At a minimum, the survey should include identification of the person and institution making the survey activity. Rather than requesting data on budgeted vacancies, which may not be reflective of the actual level of need for an occupation, a question on current recruitment efforts should be used (i.e., is the hospital currently seeking to hire any medical technologists?). Other related questions which should be asked include the translation of recruitment efforts into full-time equivalents, the shift for which these employment opportunities exist, and the total employment in full-time equivalents in the facility for a given profession. This information allows for the determination of the current level of need both in absolute and in proportionate terms. The telephone questionnaire provided on the following page shows the optimum ordering of these questions for ease of understanding on the part of the survey respondent.

The telephone survey provided was designed to provide employment opportunity information for the nursing profession. As developed, it was possible to use the survey to determine the general hiring policy of the hospital with regard to nursing credentials and educational background (i.e., whether there was a preference for baccalaureate diploma or associate degree nurses at the entry level). Salary data were also requested to determine regional variations as well as how competitive an institution with many openings may be in comparsion with neighboring institutions. One final question which was not included in the nursing survey format, but which should be included in a market survey, involves the term of the opening. Such a question should be worded as follows: "Have any of these openings been advertised for a period longer than one month?" and, if yes, "How long have these openings been available?" This question can indicate areas of acute need where available supply has not been adequate to meet market demands.

While not documented herein, there is a second form of market survey which can also provide data on the balance between employment opportunities and supply. This involves the surveying of individual health professionals to determine their employment status and other factors relating to work. These type of surveys are most effective in determining areas of potential manpower surplus (i.e., when a profession has a larger levels of unemployment). They are, however, quite time consuming as they must be run using the mailing lists of professional associations and societies. It should be noted that there are data available from CHSS and state run surveys of licensed health professionals which provide data on employment status. This information can provide an aggregate indication of manpower surplus situations.

4. PLAN FOR CONTINUAL FLOW OF HEALTH MANPOWER DATA

A number of means for the assessment and verification of health manpower projections have been presented. These methods enable an agency to determine the degree of accuracy of a set of projections at any point during the projection period. It is now appropriate to show how such applications fit into an ongoing health manpower data capacity within an agency. The following narrative, therefore, describes how

Hospital BSN Requirements Survey

Hospital: ______________________________

Hello, my name is ______. I am calling from the New Jersey Department of Higher Education, Office for Health Manpower. The Department is doing a brief telephone survey to measure the need for RNs with bachelor's degrees in the Bergen-Passaic area.

(Could you connect me with someone who can give me some information on the hiring of RNs by the hospital?)

1. Is the hospital currently seeking to hire RNs at the entry level?

   Yes No IF NO, SKIP TO Q.4.

2. Approximately how many full time equivalent RNs are you looking for?

   ______

3. For what shift? Night, Evening or Day? N E D

4. At the entry level, do you hire only nurses with bachelor's degrees, or will you hire diploma and associate degree nurses as well?

   ____

5. Which do you prefer to hire?

   Diploma ADN BSN Makes no difference

6. What is the base entry level salary, approximately? ______

7. Is the hospital seeking to hire any nurse clinicians or nurse practitioners?

   Yes No IF NO, SKIP TO Q. 10.

8. Approximately how many full time equivalents? ______

9. Is a bachelor's or master's degree required? B M

10. Are you currently seeking to hire any upper-level supervisory or administrative nurses?

    Yes No IF NO, SKIP TO Q. 13.

11. Approximately how many full time equivalents? ______

12. Is a bachelor's or master's degree required? B M

13. About how many full time equivalent RNs does the hospital currently employ?

    ______

THANK YOU FOR YOUR COOPERATION AND TIME.

a health manpower data capacity can be coordinated throughout a state and how it should function.

There are a number of organizations with needs for health manpower data. These include state departments of health, state licensing authorities, state departments of social services and mental health, state higher education authorities, state health planning and development agencies, health systems agencies, city and county public health departments, hospitals, professional associations, and colleges and universities. The immediate question to be answered with regard to health manpower data and these organizations is what agency or agencies should be responsible for the collection and baseline analysis of data. It is recognized that each agency has a number of data needs, of which manpower data are only one. Further, the data required for their health manpower analyses often will vary from agency to agency. It is, therefore, important to attempt to find areas of similarity among these agencies which can be used as a starting point for developing a coordinated data system. There are four major areas to be confornted in the development of a manpower data effort. These are: the development of a technical advisory group; the creation of objectives for this group and its data activities; the design of a manpower data collection and processing capability; and a feedback mechanism including the refinement of manpower data strategies over time.

The technical advisory body should be developed by that agency responsible for the collection and dissemination of the manpower data. It is not recommended that this agency be a local or regional (HSA) organization, as the potential for coordination should span across an entire state. Further, the responsibility for primary data collection should not rest with the HSA but with the State Agency. Accordingly, the State Agency should be the catalyst in developing a strategy for coordinated and, where possible, uniform data on both the licensed and non-licensed health professions. The staff that the State Agency would provide to the technical advisory group should be technically competent individuals responsible for data collection and processing within the agency. A large number of agencies may be afforded respresentation on the technical advisory group, however, at a minimum it should include representation from:

- the licensing authorities/boards
- the major professional societies
- the HSAs
- the state higher education authority
- the PSROs
- legilative staff
- relevant collegiate institutions (i.e., medical schools)

Once appointed, the technical advisory group should begin by exploring the health manpower data requirements of the involved constituencies, with a specific interest in areas of common need among the agencies. As the general data identification process occurs, the technical group should develop an operational goal to guide its future data activities. At this early stage, such a goal statement should first concentrate on the technical aspects of the health manpower data program, rather than the policy-related issues. Such a neutral attitude should preclude much of the inevitable conflict which will arise once policy alternatives related to the health manpower models developed from the data base are presented. The technical goal which was agreed upon for the New Jersey technical advisory group is as follows:

Goal: To provide health manpower data as an accurate and accessible resource for policy and decision makers.

Process: This will be accomplished by the establishment of a permanent central source with three operational functions:

1. the collection of health manpower data
2. the processing such data
3. the dissemination of health manpower information

The design of this goal purposely avoided the mention of policy activities so as to create a technically neutral orientation among the representatives involved.

With the creation of a data-related goal for the technical advisory group, determination of the types of data to be collected should be made. For those states which do not have a CHSS Manpower Component, it is strongly recommended that the first area of data collection concern the licensed health professions. It is further recommended that the format used in the design of the data collection instrument closely follows the Minimum Data Set developed for the National Center for Health Statistics CHSS surveys. However,it should be recognized that the data collection effort is one which should continue on a periodic basis. Therefore, the survey design should be one which will be applicable to subsequent surveys and will minimize the need for changes in software design. The most efficacious manner to accomplish this is by the creation of a registry of health professionals. Such a registry would collect the system's baseline data during the first survey cycle. These data can be housed in a system which allow for the printing on a new survey form when the second survey cycle is reached. The responding professional will need only to update any changes in his/her file (i.e., location of practice) in responding to the second and subsequent surveys. It would also be useful to fully integrate the survey update information with the license renewal form so as to insure a continually high response rate. For those which already have a CHSS Manpower Component, the area of data concentration should be the non-licensed health professionals. A model methodology to collect manpower data on these professionals is offered in Task 1 of this final report.

Once data collection methods have been implemented, a number of new issues emerge. First, the technical advisory group working with the State Agency should determine what protocols should exist with regard to software design and access to raw data. For example, requests for access to the data files may occur from a number of sources not involved in the technical advisory group. including consulting and research firms, medical equipment and pharmaceutical sales firms, internal revenue, etc. Definitive protocols for access to the data base from these and all other potential users must be developed. One manner in which confidentiality can be maintained may be through the creation of two separate files, one containing the name and location of the practitioners and the other containing the data provided on the questionnaire. Regardless what software model is used, care must be taken to provide requisite confidentiality while conforming to the intent of laws concerning freedom of information. A second area of concern involves the reporting formats of data for general dissemination of the survey results. It is recommended that, at a minimum, state level, planning area level, and county level descriptions of the survey results be provided in a summary report which offers all major data elements of the survey including age, race, sex, specialty, credential status and employment status. Sub-county reporting by minor civil division is desirable for head counts, full-time equivalency, and specialty data. However, this smaller scale of presentation should be avoided when presenting demographic profiles of a professional workforce. In developing a reporting format, it is also important to identify all potential users of the manpower reports. Besides the organizations represented on the technical advisory body, there are a large number of other agencies which should be included in the dissemination process including: colleges and universities, schools of vocational education, CETA programs, all hospitals, local professional associations, and public health departments.

The comprehensive dissemination of health manpower supply data completes the major charge of the technical advisory group. However, once these data are available, the group should be ready to move forward into the more substantive issues of health manpower planning. It can refine its strategy and goals to meet the demands for problem identifying at the state and local levels. The most fundamental data analysis need is the determination of the maldistribution of health professionals across a geographic area. In one instance, the technical advisory group can be used as a catalyst in the development of Health Manpower Shortage Area designation requests. It can also be used as a resource to identify areas where greater recruitment or educational preparation are required. From a longer term perspective, the technical advisory group can play an important part in the development of future projections of the requirements for the various health professions in a state or geographic area. Such requirements can be calculated using a number of models, including the practitioner to population ratio, the auxiliary to practitioner ratio, and econometric techniques. Description of an application of the latter two techniques is provided in the discussion of Project Task 4. Beyond the development of quantitative estimates of need, the technical advisory committee may wish to provide advisory recommendations on health manpower policy based on its studies. This advisory input might be offered to educational decision makers, the statewide health coordinating council (SHCC), the state authority for health facility licensure and rate setting, the state licensing boards for health professionals, and the state legislature.

In reviewing the task narrative and general data model outlined above, it should become evident that there is fundamental order in which a state can build a coordinated health manpower data system leading to a coordinated approach to policy making. This fifteen step process is as follows:

1. identify relevant agencies for health manpower data coordination.
2. create a technical advisory body reporting to the state health planning and development agency.
3. develop an operational goal for the technical body with which all constituencies can agree.
4. develop data collection instruments.
5. coordinate the collection of health manpower data.
6. develop a software system responsive to the demands of efficient updating and confidentiality requirements.
7. develop a uniform approach to the dissemination of health manpower information reports.
8. create a plan for updates of the data base.
9. explore and agree upon expanded goals for the technical advisory body.
10. determine areas of current maldistribution and unmet need.
11. develop policy recommendations for the management current maldistribution situations.
12. design mutually agreeable models for the projection of future health manpower requirements.
13. broadly disseminate the results of health manpower projections.
14. develop policy recommendations to confront potential shortages and surpluses of health professionals.
15. verify and assess the accuracy of the health manpower projections on a periodic basis.

F. TASK 6: Recommendations Concerning The Development of Formal and Informal Relationships Among the SHPDA and HSAs in a State

1. STATUS OF THE TASK

The purpose of this task was to continue to implement the "linkage" program develped during New Jersey's initial linkage contract which was completed in early 1976. During that initial project, New Jersey had convened a linkage strategy group which enabled the Department of Higher Education to develop a health manpower information system and led to the dissemination of several publications concerning health professionals in New Jersey. At the end of this initial contract, the Department of Higher Education shifted the responsibility for primary manpower data collection and reporting to the State Health Planning and Development Agency (the New Jersey Department of Health). With this shift, the linkage strategy group was expanded and became the technical advisory committee for the SHPDA's development of a Cooperative Health Statistics System. The manpower subcommittee of the newly created Technical Advisory Committee on Health Data, which also provides technical advice to the Department of Higher Education, was charged with overseeing the completion of New Jersey's second health manpower contract.

The strategy behind the creation of a linkage network in New Jersey has always been premised on the mutual need for health manpower data on the part of a large number of organizations and agencies. With a moderate degree of success, we have been able to insure that most hospital planning activities (which are required for licensure) and health systems agency plans have used a common data base with regard to health manpower. Our linkage efforts have also been expanded in the area of local health manpower planning with an emphasis on providing technical input and advice to the HSAs in their development of Health Manpower Shortage Area designation applications. Work has also been started on the development of a method to generate local projections of health manpower requirements based on the statewide projection models. Another important area of project staff involvement has been in the design and processing of health manpower surveys by the State Agency. For the first time, we expect that the SHPDA's Health Data Services Unit will be able to provide distributional information based on local geocodes (zip code and minor civil division). This improvement in the State's health manpower information system will be very helpful in both local planning and shortage area identification activities.

During this two year contract, New Jersey has been able to make substantive improvements in its manpower data capabilities. With these improvements either in existence or under final development, the linkage program will be able to move forward into health manpower policy areas to a greater degree than has been possible in the past. The areas with which we intend to become more fully involved include: the development of a series of projections of physician manpower requirements by specialty; the creation of a coordinated graduate medical education system based on physician needs by specialty; and, possibly, the implementation of a state run medical loan redemption program to enable placement of M.D. and D.O graduates into state-designated areas of physician shortage. While these plans are not documented in this report, we believe that they are a direct result of the successful implementation of the linkage program in New Jersey. The following narrative describes other contract accomplishments in the area of linkage development with the SHPDA and New Jersey's HSAs. It also offers a number of general suggestions concerning coordination between SHPDAs and HSAs which may be helpful in the development of coordination approaches in other states.

2. METHODOLOGY TO REWORK HEALTH MANPOWER DATA BASE TO HSA CONFIGURATION

The purpose of this sub-task was to enable New Jersey to rework its existent data base from CHP delineation to HSA boundaries. In New Jersey, two CHP "B" Agencies' boundaries remained intact with the implementation of P.L. 93-641, when five Health Service Areas were created from the existing four CHP areas. In the following table, the changes in county alignments are shown.

Comprehensive Health Planning Area	Counties	Health Service Area	Counties
I	Bergen	I	Bergen
	Passaic		Passaic
	Hudson	II	Sussex
	Sussex		Essex
II	Essex		Morris
	Morris		Union
	Union		Warren
	Warren	III	Hudson
III	Hunterdon	IV	same as CHP III Counties
	Mercer		
	Middlesex		
	Monmouth		
	Ocean		
	Somerset		
IV	Atlantic	V	same as CHP IV Counties
	Burlington		
	Camden		
	Cape May		
	Cumberland		
	Gloucester		
	Salem		

These new alignments of counties compelled New Jersey to rework the software of its health manpower information system to allow for output arranged by health service area. This reprograming was completed during the first contract year.

A second aspect of reworking the health manpower data base to the HSA configuration is the revision of statewide health manpower projections to the planning area level. The methods used to project health manpower requirements at the state level are fully documented in the Task 4 narrative. The most important models used concern the licensed health professions (i.e., physicians, dentists, nurses, etc.). These models are based on regressions of county level observations. As there are twenty-one counties in New Jersey, the degrees of freedom for the nine projection equations for licensed professions vary from 16 to 19. If a similar regrassion technique was used to generate unique equations for each planning area, there would be severe limitations in the degrees of freedom for the HSA equations. In fact, it would not be possible to develop unique equations for HSA I and HSA III based on county level observations. This limitation has compelled staff to consider using the statewide projection equations, in conjunction with planning area level data, to create unique projections of demand for each HSA.

The methodology to rework the projections of demand consists of developing time series data for each variable present in the demand equation for each profession. For example for physicians, the dependent variable is the physician to population ratio and the independent variables are income, age, and hospital visits. Therefore, local changes in each variable over time must be measured to allow for the calculation of the projected percentage changes from 1975 to 1980 and 1975 to 1985. For population size, these data are available by county from the official state population projections from 1970 through 1990. Data on age of the population are available from the U.S. Census and county planning authorities. The State Department of Labor and Industry has selective data on income of the county populations, which can be compared to U.S. Census data. Finally, hospital utilization data are available from the AHA Annual Reports and the SHPDA's statewide health facilitites plan. Aggregating these data by planning area and calculating the projected change in each variable over the projection period, allow for the creation of projections of demand by planning area.

On the supply side, counts of each profession are readily avilable by planning area configuration. Using these counts as baseline (1975) supply, changes in supply are adjusted for attrition by applying statewide profession - specific separation rates developed by the U.S. Department of Labor. Additions to manpower supply are calculated by weighting the statewide annual increase in newly licensed professionals by the current proportion of active professionals in the planning area compared to the statewide level of active professionals. Calculation of health professional supply in a planning area can than be completed in the same manner explained in the Task 4 narrative. It should be recognized that this method of applying a state level model to local planning areas is the simplest means to create local projections. It does, however, have certain limitations including the assumptions that the interrelationships between the demand variables in the statewide equation are also relevent at the local level and that the distribution of newly licensed professionals across the state in the future will be comparable to the baseline distribution of health professionals. Within these constraints, this local projection method is a reasonable technique. However, new means of the projection of local health manpower requirements should be developed on a cooperative basis between state and local planners. This is one area which New Jersey must confront in the future.

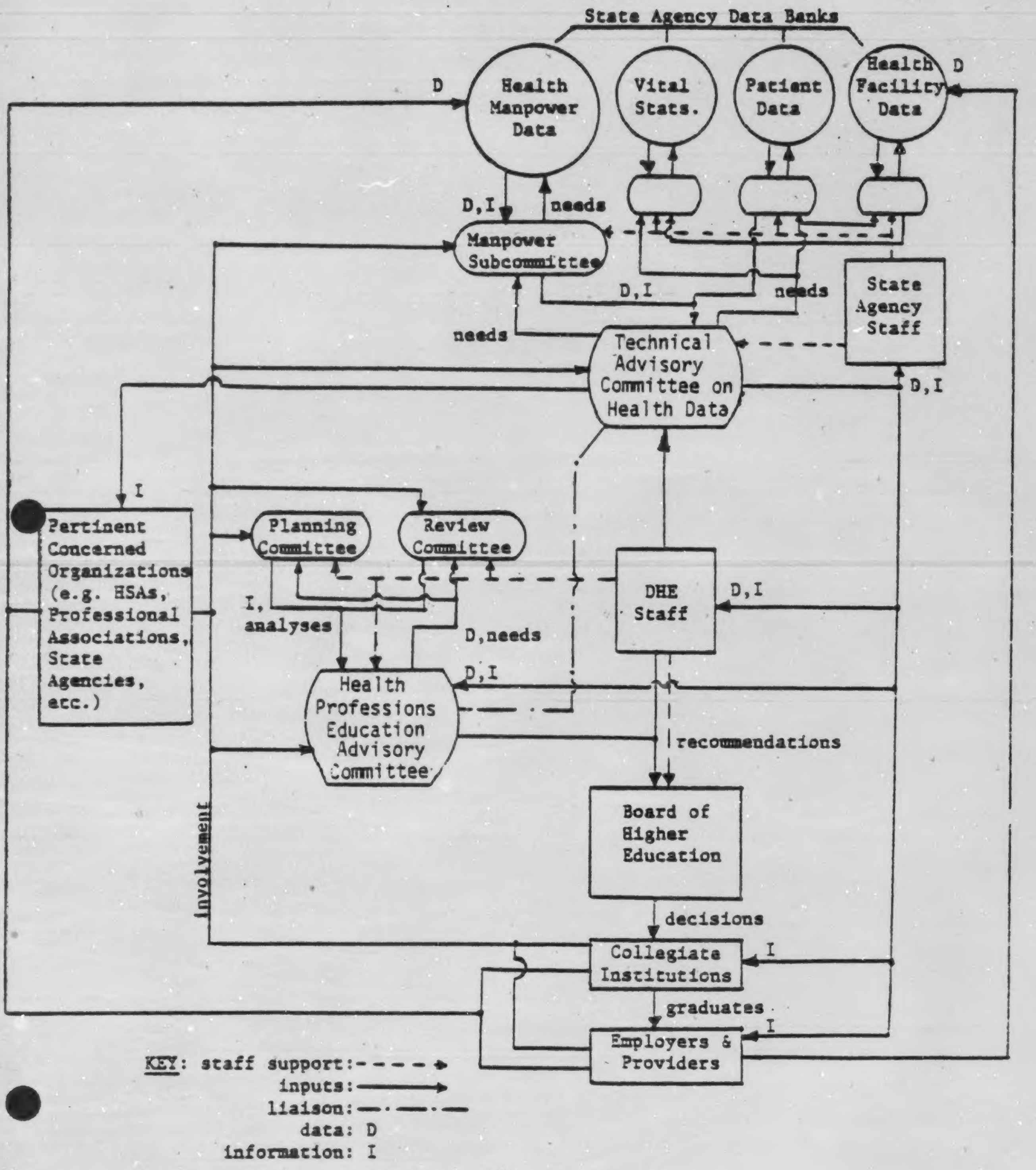
3. PLAN FOR COORDINATION OF FUTURE DATA SETS

The New Jersey plan for coordination of future data sets among state and local planning agencies (i.e., state higher education, SHPDA and HSAs) is based on the continuation of the manpower strategy group and the expansion of current data collection and analysis activities. This manpower strategy group has always been involved in the operation of the health manpower information system, at first, when it was housed within the New Jersey Department of Higher Education and later within the SHPDA. Originally, the strategy group was named the Interagency Advisory Committee on Health Manpower. When it was shifted to the SHPDA, it was reconstituted as the Technical Advisory Committee on Health Data (TACHD). A standing subcommittee of the TACHD now oversees the development and operation of the health manpower data component. The following discussion details how the strategy group interfaces with the continued development of our manpower data capacity.

The structure for New Jersey's current health manpower linkage and advisory netweork is shown in the figure on the following page. Overall, this sytem effectively coordinates the State Agency's data activities while allowing for a single advisory body to make recommendations to the Board of Higher Education. The final decision for program approval and master planning rests with the Board of Higher Education. The Health Professions Education Advisory Council (HPEAC) provides advice to the Board on _all_ matters in health professions education, from new program approvals to master planning activities. HPEAC also makes recommendations to the Board based on future health manpower requirements as developed by DHE staff under the joint purview of HPEAC's Planning Committee and the Technical Advisory Committee on Health Data's Manpower Subcommittee. Therefore, the sequence of coordination from data activities to health manpower resource allocation under this advisory structure is as follows:

1. The Manpower Subcommittee develops health manpower data collection instruments.

2. The State Agency collects manpower data through the licensing authorities using these questionnaires.


State Agency Data Banks
Health Manpower Data
Vital Stats.
Patient Data
Health Facility Data
D
D
D,I
needs
Manpower Subcommittee
D,I
needs
needs
State Agency Staff
Technical Advisory Committee on Health Data
D,I
I
Pertinent Concerned Organizations (e.g. HSAs, Professional Associations, State Agencies, etc.)
Planning Committee
Review Committee
DHE Staff
D,I
I, analyses
D,needs
D,I
Health Professions Education Advisory Committee
recommendations
Board of Higher Education
involvement
decisions
Collegiate Institutions
I
graduates
Employers & Providers
I
KEY: staff support:
inputs:
liaison:
data: D
information: I

3. With the advice of the Manpower Subcommittee, the State Agency computerizes new health manpower data.

4. The Technical Advisory Committee releases Health Manpower Information Series reports developed by the State Agency's Health Data Services Unit.

5. In conjunction with the DHE staff on TACHD, the HPEAC Planning Committee liaison reports new data to HPEAC Planning Committee.

6a. If new health manpower requirements are scheduled to be calculated, DHE staff, using the TACHD/HPEAC approved projection methodologies, develops future manpower projections.

b. If new requirement calculations are not scheduled, manpower data are added to the longitudinal data base and supply data are compared to projected supply data in the Master Plan to verify the health manpower projections.

7a. If new projections are developed by DHE staff, review and approval are afforded to the Health Manpower Subcommittee. After their recommendations are made, projections are integrated into the Master Plan which is presented to HPEAC and, finally to the Board of Higher Education.

b. If new projections are not developed, DHE staff reports any significant findings of the new data to the TACHD and HPEAC for their information and possible use in public policy development activities.

8. When collegiate institutions are developing new program plans, access to the health manpower data base and projections is provided to them.

9. Once new program plans are submitted to DHE for Board approval, HPEAC develops recommendations for the Board based on a program review and its planning data base, which includes the health manpower requirements.

10. The Board makes its final decision using HPEAC and staff recommendations which include the analyses of health manpower needs as well as a qualitative evaluation of the proposed program.

Through HSA involvement in the TACHD and the Manpower Subcommittee, their ongoing input into the maintenance and refinement of the health manpower data base has been assured. Their involvement in this process has led to significant inprovements in the SHPDA's data system. Most notable has been the creation of geocoding scheme which is being integrated into the system's software to allow for the generation of detailed local manpower data. On a second level, we intend to move forward in the area longitudinal data base development for the non-licensed health professions. The collection methodology to be employed is fully documented in the Task 1 narrative. The collection activity will be coordinated at the state level, while survey administration will be sub-contracted to each HSA. Data processing and reporting will be the state's responsibility, and all data will be fed back to the HSAs to meet their planning needs. In this manner, each HSA will be provided with a data collection experience and will be utilizing data for planning purposes. If this collection effort is successful, it will be run on a periodic bases by the State Agency using a software-based method which will merely require updating of the original response by each surveyed institution.

One new undertaking by the Department of Higher Education in conjunction with the College of Medicine and Dentistry of New Jersey, which should be noted, is the creation of a system to rationalize the provision of graduate medical education opportunities (i.e., residency programs) in New Jersey. This program is required to develop estimates of the future requirements for physicians by specialty at the local and state levels. In order to create a methodology which can be used to determine specialty needs, a manpower advisory group has been convened to provide input to the Graduate Medical Education Advisory Council and the Department. This manpower group, which will have a liaison to the Manpower Subcommittee of the Technical Advisory Committee on Health Data, includes representation from the local planning agencies. Through this HSA involvement, we anticipate that the model which is eventually designed will not only meet their organizational needs, but will also be more sensitive to the local health manpower situations in New Jersey.

4. GENERAL GUIDELINES AND SUGGESTIONS FOR THE COORDINATION OF SHPDAs AND HSAs IN HEALTH MANPOWER ACTIVITIES

In developing a relationship with the HSAs and SHPDA in New Jersey, it was important for project staff to seek out commonalities between these agencies and the Department of Higher Education. Moreover, the best means to seek out these commonalities was to develop a documents which explained the network for health manpower planning in the State from its inception to its current operation. Within the context of its current operation, the role and involvement of project staff, as well as potential roles for the HSAs were provided. Appendix VI contains this document which is entitled "Coordination of Health Professions Education Planning Initatives at State and Local Levels." Briefly, this report explains the development of the Health Professions Education Master Plan and discussed its major goals and objectives. The report describes the Department's advisory network for health manpower data, planning and program review activities. With regard to the review of newly proposed health professions education programs, the entire program review system is explained and the local planning agency's role in the process provided. The report also identifies all Departmental staff involved in the health manpower area, and provides their specific responsibilities as well as a synopsis of all previous work completed by them. Finally, the alternative roles for the local planning agencies in the ongoing statewide health professions education planning process were presented.

Once this paper was disseminated, project staff went to each health systems agency in New Jersey to meet with agency directors and relevant staff members. The purpose of these meetings was not only to get acquainted with these local planners, but also to discuss how each agency might provide beneficial input to the other. The end product of these meetings was often different from HSA to HSA. One common area of concern was the availability of local data on health professionals which were not in existence at that time. Also, a strong desire on the part of each of the HSAs to have Health Manpower Shortage Areas designated within their counties was evident. In other areas, each of the agencies responded differently to our attempts to coordinate them with the State's health professions education planning process. In two cases, there existed a strong interest in expanded HSA involvement and coordination, while at the three remaining HSAs, there was minimal interest. This variation among the agencies was caused by their differing views of what the role of an HSA should be, coupled with their preoccupation with the development of their annual plans and their involvement in the review of certificate of need applications. Due to the numerous charges to the agencies, it is not surprising that they view health manpower planning as a lower priority area.

While New Jersey's situation with regard to health manpower planning is unique in that the responsibility for it rests with the higher education authority, our experience in this area has made evident a number of general suggestions for enhanced coordination between SHPDAs and HSAs. These are as follows:

1. Determine and Establish Areas of Mutual Technical Need and Concern. This can be accomplished by creating a strategy group of middle level technical managers from the SHPDA, HSAs, state level authorities for licensure, mental health, drug treatment, and higher education, employers (hospital association), educators, and professional associations. This group can determine where technical limitations exist and what technical remedies can be initiated to solve them.

2. Develop Methods to Address Mutual Need. Using the forum of the strategy group, create potential solutions to meeting the agreed upon needs to be implemented through the SHPDA or another state agency to minimize resource demands on the other agencies (i.e., HSAs).

3. Produce and Disseminate Documentation in Formats Usable by State and Local Concerns. After having developed technical methods which meet the above constraints, the results of the implementation of these processes (i.e., data collected) should be produced by the SHPDA, reviewed by the strategy group and published. This could also be accomplished through the sole initiative of the State Agency, wherein no strategy group is established but areas of need within the HSA are determined and reports relevant to their needs are developed.

4. Analyze the Results of the Technical Analysis. Once the technical data are produced, it is possible to analyze their meaning from both the local and state perspectives. General areas of study would be the identification of areas of current manpower shortage or surplus (maldistribution) or the identification of areas of eventual need (i.e., areas where health professionals are uniquely older).

5. Develop Strategies and Policies Based on Analysis of Current Situations. Depending on what findings are developed from the technical analysis, a number of policy strategies can be developed to confront situations in selected geographic areas, including the development of new educational programs, the limitation or expansion of current educational programs, the development of continuing educational programs, the encouragement or discouragement of health facility development, and the amendment of practice laws to enable expanded roles or capacities for current professionals.

6. Work to Implement Manpower Strategies. Using the findings and recommendations of the strategy group, the SHPDA should lead efforts to integrate desired policy changes into the planning and decision making activities of those agencies and authorities responsible for such policy areas.

7. Analyze of Future Manpower Situations. Besides identifying current areas of concern, the SHPDA and HSA strategy group should determine future manpower requirements to demonstrate potential problem areas which can be addressed by changes in current educational, regulatory, or service provision policies.

8. Develop and Implement Manpower Policies. Once the future manpower situations in the local planning areas and the State have been determined, corrective policies to address these manpower needs should be developed. The SHPDA should also spearhead efforts to see that these policy recommendations are accepted.

9. Develop Special Studies to Meet Areas of Need. Rather than creating a full fledged manpower information - planning system as described from #2 to #8 above, it may be more meaningful to address only certain issues

which meet the concerns of both the HSAs and the SHPDA. Such an issue orientation can be more timely and create fewer demands on staff. Some areas which would probably be of the greatest interest to SHPDA and HSAs alike include development of designation applications for health manpower shortage areas, study of service and specialty needs of the population, analysis of the impact of foreign medical graduates on the physician workforce, and study of fiscal implications of in-service educational programs on quality and per diem rates. These types of issue-related studies can help to solve local health manpower problems, and serve to heighten the awareness of the local HSAs as to the relevance of health manpower planning in meeting the objectives of their organization.

The common vein which exists in all the above suggestions is that, in most cases, health manpower is of minimal concern to the HSAs. Accordingly, their desire to commit staff time and resources to develop a health manpower planning capacity is usually not widespread. Therefore, it is the state, or more specifically, the SHPDA, which must bear the burden of developing a capacity which is relevant to local needs. Not only does this mean the commitment of staff, but it includes the commitment of resources for health manpower data collection and processing. It is also the SHPDA which should function as the catalyst to enhance the HSAs interest and involvement with health manpower planning and policy activities. The degree to which it is successful will depend upon how flexible a data component the SHPDA can create and how amenable it is in carrying forward manpower policy recommendations developed by local planning authorities.

G. TASK 7: Evaluate and Document the results of the Project

Because many of the tasks of the contract involved the design of data collection models and their pretesting and presentation, it is not possible to evaluate these tasks in quantitative terms such as response rates and standard errors of proportion of resulting survey statistics. However, it is possible to quantify the accuracy of the projections of health manpower requirements developed during this contract. Therefore, this project evaluation will present a quantitative assessment of the health manpower projections developed in Task 4 and a qualitative anaylsis of the degree of completeness of each task.

1. QUANTITATIVE ASSESSMENT OF THE PROJECTIONS

In the Task 4 narrative, a method for developing confidence bands around the projections of demand for the health professionals is described. Using this quantitative approach upper and lower limits to the demand projections at a confidence level of 95% have been developed. Shown below are the results of these confidence bands for each 1985 demand projection.

Profession	1985 Demand	Demand Confidence Band		Total Per Cent of Confidence Band
		Value	Per Cent	
Physicians	16,300	±400	±2.5%	4.9%
Dentists	5,980	±160	±2.7%	5.4%
Dental Assistants	5,490	±130	±2.4%	4.7%
Dental Hygienists	1,050	± 25	±2.4%	4.8%
Dental Lab Techicians	1,790	± 40	±2.2%	4.5%
Nurses	54,800	±170	± .3%	.6%
Optometrists	972	± 29	±3.0%	6.0%
Pharamcists	5,110	±120	±2.3%	4.7%
Veterinarians	1,040	± 60	±5.8%	11.5%
Cytotechnologists	142	± 2	±1.4%	2.8%
Histologic Technicians	155	± 2	±1.3%	2.6%
Medical Technologists	1,460	± 11	± .8%	1.5%
Medical Lab Technicians	1,450	± 11	± .8%	1.5%
Medical Lab Assistants	553	± 4	± .7%	1.4%
Medical Records Administrators	161	± 2	±1.2%	2.5%
Medical Records Technicians	159	± 2	±1.3%	2.5%
X-Ray Technicians	5,960	±240	±4.0%	8.1%
Nuclear Medicine Technologists	212	± 9	±4.2%	8.5%
Occupational Therapists	427	± 21	±4.9%	9.8%
Occupational X-Ray Assistants	306	± 15	±4.9%	9.3%
Physical Therapists	1,310	± 65	±5.0%	9.9%
Respiratory Therapists	143	± 3	±2.1%	4.2%
Respiratory Technicians	545	± 8	±1.5%	2.9%
Speech Pathologists/Audiologists	975	± 60	±6.2%	12.3%

These confidence bands are based entirely on the interrelationships of the variables of each projection equation. Accordingly, they represent a 95% confidence that demand should fall within the ranges shown above, under the limitations of the model. These confidence bands do not take into consideration the accuracy of the models when compared to other models.

Another means to measure the general accuracy of New Jersey's health manpower projections is to determine how the upper and lower limits of demand compare with projected supply. This can show us whether or not projected manpower shortages or surpluses are also anticipated at the high and low limits of demand. The table below shows the influence of the confidence band on the comparison of supply and demand.

Profession	1985 Manpower Need*					
	At Lower Limit of Demand		At Midpoint Demand		At Upper Limit of Demand	
	Number	Per Cent**	#	%	#	%
Physician	+140	.9%	-260	-1.6%	-660	-4.1%
Dentists	-20	-.3%	-180	-3.1%	-340	-5.9%
Dental Assistants	+680	11.3%	+550	9.1%	+420	6.9%
Dental Hygienists	+65	5.0%	+ 40	3.7%	+ 15	1.4%
Dental Lab Technicians	-100	-6.1%	-140	8.5%	-180	-10.9%
Nurses	+3100	5.5%	+1400	2.5%	-300	-.5%
Optometrists	-81	-9.4%	-110	-12.8%	-139	-16.1%
Pharmacists	-360	-7.8%	-480	-10.4%	-600	-13.0%
Veterinarians	-33	-3.5%	-93	-9.8%	-153	-16.2%
Cytotechnologists	-17	-11.2%	-19	-12.5%	-21	-13.8%
Histologic Technicians	-21	-15.9%	-23	-17.4%	-25	-18.9%
Medical Technologists	-19	-1.3%	-30	-2.1%	-41	-2.9%
Medical Lab Technicians	+161	10.1%	+150	9.4%	+139	8.7%
Medical Lab Assistants	-79	-16.8%	-83	-17.7%	-87	-18.5%
Medical Records Administrators	-17	-12.0%	-19	-13.4%	-21	-14.2%
Medical Records Technicians	+54	25.6%	+52	24.6%	+50	23.7%
X-Ray Technicians	+1250	17.9%	+1010	14.5%	+770	11.0%
Nuclear Medicine Technologists	+60	22.8%	+51	+19.4%	+42	15.0%
Occupational Therapists	-28	-7.4%	-49	-13.0%	-70	-18.5%
Occupational Therapy Assistants	-8	-2.8%	-23	-8/1%	-38	-13.4%
Physical Therapists	-65	-5.5%	-130	-11.0%	-185	-15.7%
Respiratory Therapists	+95	4.0%	+92	3.9%	+89	3.8%
Respiratory Therapy Technicians	+97	15.3%	+89	14.0%	+81	12.7%
Speech Pathologists/Audiologists	+115	11.2%	+55	5.3%	-5	-.4%

*Manpower Need is calculated by subtracting demand from supply. Therefore, a negative sign (-) demand denotes a shortage of personnel.

**Per Cent of Manpower Need at each level of the confidence band is calculated by dividing the manpower need by the total 1985 projected supply for a profession.

Observation of the second table indicates that the majority of the health manpower projections of need exhibit minimal proportinate fluxuation when the demand confidence bands are used. Notably, the models used to project demand for the non-licensed health professions are the most consistent and "accurate" projections. In certain cases, the licensed health professions models show variations which alter projected surplus situations at the lower limit of demand to shortages at the upper limit of demand. For example, a 140, or .9%, surplus of physicians is projected at the lower limit, while a 4.1% shortage of 660 physicians is projected at the upper demand limit. A similar situation occurs with the projection of need for nurses. For the remaining health manpower projections, fluxuations do exist in the manpower need projections, however, either the surplus or shortage situations projected remain at the low, midpoint and upper demand levels, with only changes in their size occurring.

2. QUALITATIVE ASSESSMENT OF PROJECT TASKS

There were seven major tasks assigned under the Scope of Work of this two year contract. The following section is a qualitative assessment of the degree of completeness for each of these tasks and their sub-tasks.

Task 1 : Develop, Conduct and Document a Methodology for Collection of Data on Non-licensed Health Manpower.

Sub-task a: Survey and evaluate the availability of all pertinent data collection methods.

This sub-task was completed during the first project year. A survey letter was sent to every State Health Planning and Development Agency in the United States and all health manpower linkage programs. There were very few agencies concerned with the collection of data on non-licensed health professionals. In some cases, notably Illinois and Iowa, surveys of selected non-licensed professions were undertaken, however, these surveys were developed as one time observations of the employment of a limited number of professional groups. On a national scale two surveys, the NCHS Survey of Hospital Manpower and the BLS Occupational Employment Surveys, were found to be useful sources yet they did have a number of limitations, which are noted in the task narrative. Also, of interest are the Cooperative Health Statistics System health facilities component surveys which provide limited employment data. After this analysis of other survey activities, it was evident that no uniform model for collection of non-licensed health manpower data was readily available.

Sub-task b: Develop two survey instruments for data collection.

Based on the information available from the survey of data collection activities in other jurisdiction, two survey instruments were developed which could be used to collect data on non-licensed health professionals. The first instrument was developed to elicit employment data on a number of professional categories, while the second was designed to determine social-demographic information on individual non-licensed professionals.

Sub-task c: Pretest the surveys on not more than nine health manpower personnel.

Due to the limitations on pretesting the survey instruments on a reasonably large number of personnel, pretesting of the survey questionnaires was accomplished through the input of the manpower advisory committee. This committee, which is comprised of both employees and health personnel responded to the prelimnary survey designs and the questionnaires were refined in accordance with their input. Survey pretesting outside of this group was not undertaken.

Sub-task d: General requirements for the survey instruments.

The survey administration procedure details the requirements of this sub-task. Specifically, it identifies the targeted non-licensed health professions, defines each profession and identifies all major employment sites which should be included in an employment survey.

Sub-task e: Requirements for the employment survey.

The employment survey designed in this task meets the requirements of the contract. The survey instrument provided was designed for use in employment surveys of hospitals. It includes each of the target non-licensed health professional categories and can provide detailed data on the full-time and part-time employment of each profession, by credential status. The method for design and administration of this sruvey by institutional type is included in the task narrative.

Sub-task f: Requirements for the demographic survey.

The demographic survey designed for the response of individual health professionals conforms to the requirements of the contract. In designing this survey, the categories of questions selected were premised on the general design of CHSS manpower surveys. The survey questionnaire is designed to provide a uniform data base in all the professional categories in order to minimize the cost of software development. Among the data which the questionnaire will elicit are name, date of birth, location of residence, location of work, sex, primary work activity, educational background, professional credential status, race and ethnicity. A coding plan for this survey was not developed under this contract, however, the survey can be coded to a two card format.

Sub-task g: Develop methodology for administration of the surveys.

The task narrative provides a general method for the administration of a non-licensed health manpower data activity. This method is three tiered. The first element of the model is the collection of data from existing sources. The second involves the collection of employment data at a number of settings using the predesigned questionnaire. Finally, the third step in this process calls for the collection of demographic information concerning the non-licensed professionals. Such a data collection effort will provide information similar to CHSS manpower component data. The method of survey administration also provides general guidelines for sample stratification in the demographic survey and suggests a coordinated survey method for the employment survey which utilizes the HSAs in the collection procedure.

Task summary

With the provision of the requisite survey questionnaires, and a general model for survey administration, the requirements of this task have been met in full.

Task 2: Develop a Methodology for Tracking Graduates of Health Professions Education Programs

Sub-task a: Survey and evaluate data collection methods used for health professions education graduates in other states.

To survey and evaluate the applicability of data collection mechanisms which have been or are currently being used in the United States for tracking health professions program graduates, a survey of every state-level higher education coordinating agency, every state health planning and development agency, all linkage projects, many individual health professions schools and all New Jersey institutions of higher education was undertaken. We were unable to find a sound, generally applicable methodology for tracking health professions graduates. Although some state-level higher education authorities and most academic institutions make some effort to collect post-graduation data on their graduates in general, few of these efforts were organized, on-going activities and none could be adopted in entirety to meet this project's needs. However, portions of some surveys and survey procedures were adopted for use in this task and were fully documented within the task narrative.

Sub-task b: Develop survey instruments to collect data on health professions graduates.

Based on the information and suggestions received from the national survey of data collection activities, two survey instruments were developed which could be used to track health professions graduates over a five-year period. The first survey was designed to elicit information about graduates 18 months after graduation. The second questionnaire was designed to again survey respondents of the first survey approximately 3 1/2 years after graduation in order to complete a five-year longitudinal or panel study of respondents.

Both surveys meet the data requirements specified by this sub-task. They elicit data on respondent's opinion of adequacy of the occupational preparation received, current employment status, current residence, location of employer, relationship of current occupation to health professions degree, and continuing education activities. The surveys also collect information or work setting, reason for unemployment, attitude about current job salaries and professional licensure and certification.

Sub-tasks c and d: Pretest the suvey instrument and revise the instrument as necessary.

The general format and many of the survey questions were formulated in conjunction with a general Departmental project developing a post-graduation data base for all graduates of New Jersey colleges and universities. The general survey instruments were extensively pretested by the DHE Office of Planning and Research in a large pilot study. The revisions of format and questions on the general survey which resulted from that study were adopted for this project's survey instruments as well. It was thought that "pre-testing" in this fashion through the benefits of a large pilot study of a similar survey would be more insightful than specifically pretesting this project's surveys on nine respondents as delimited by the contract.

Sub-task e: Develop a general methodology for computer programs to house and access survey data.

The task narrative provides a general methodology for the development of computer programs to house and access the survey data. The survey instruments were designed to allow keypunchers to punch directly from the questionnaires. General directions concerning questionnaire editing were included. Code books were developed for both survey instruments. These are documents which outline the format of a data file by describing the location of variables and assigning keypunching locations to specific attributes making up those variables. From these documents computer programs can be written to place the data on magnetic tape or disk so that statistical analyses can be conducted.

The code books developed for the prototype surveys were designed to complement two well known computer statistical packages used in the analysis of survey data by researchers with little or no expertise in data processing. The software for these programs are usually, available or can be easily acquired by most academic computer centers.

Details concerning this methodology appear in the task narrative. The code books are included as Appendix II of this report.

Sub-task f: Develop a general methodology for administering the survey instrument.

The task narrative presents a specific and detailed methodology for administration of the mail survey by a college or university. The methodology includes specific directions for survey assembly and distribution; survey follow-up procedures designed to increase response rates; instructions for the processing completed surveys, and; methodologies to measure non-response bias within the survey data. The task narratives conclude with a discussion of two ways in which survey data on health professions graduates can be aggregated into a state-level data base.

Task summary

With the provision of the required survey instruments, a specific methodology for their administration and a general model for computer storage and access of data, the requirements of task have been met in full.

Task 3: Develop a Methodology to Document the Level of Retention of Health Profession Graduates in a State Work Force.

Sub-task a: Survey past activities conducted by the educational institutions in New Jersey to locate health professions graduates of their programs.

As detailed in the task narrative, a survey of the data collection efforts of New Jersey colleges was not successful in obtaining usable data on the retention of health professions graduates. Briefly, it was found that although nearly every New Jersey college and university conducted some sort of post-graduation survey, the survey instruments and procedures vaired so greatly that data could not be aggregated to form a reliable statewide view of the post-graduation pursuits of health professions graduates.

Sub-task b: Compare existing data to known trends in the State to check current assumptions.

Although the activity conducted for sub-task (a) did not yield data with which to validate current assumptions on in-state retention, there were two exceptions. It was found that the State's medical and dental schools, through their alumni offices kept ongoing and reliable data on the location of their graduates. This data was used to verify the projection methodology's assumptions with regard to the in-state retention of physicians and dentists educated in the State.

Sub-task c: Develop a methodology to collect data concerning health professionals in the future in a coordinated manner.

Staff worked in conjunction with the DHE Office of Planning and Research to develop and implement a methodology to collect data concerning health professionals (and all other graduates) in a coordinated manner. The effort was only partially successful in that DHE failed to obtain the cooperation of all institutions in this effort. However, some data will soon be available from the DHE post-graduation study which will allow a check on current assumptions concerning retention rates. Further, concerning a general methodology to collect data on health professions, the survey instrument and protocols developed fro Task 2 could be implemented by a college to obtain information describing the retention within the State's work force of health professions graduates.

Sub-task d: Develop a general plan for administering the methodology that might be used by individual educational institutions, with the information being aggregated at the state level.

The survey procedures and instruments developed in Task 2 could be utilized by an individual educational institution to obtain data on the location of employment of its health professions graduates. A centralized survey activity conducted by a state-level agency (specifically DHE) was chosen as a way in which to get a coordinated, state-level view of post-graduation activities. This approach was not successful because the full cooperation of all institutions was not attained. The task narrative suggests instead that a decentralized approach would have a better chance of success provided that institutions could be persuaded to adopt uniform survey questions and procedures.

Task summary

As described in the above evaluation, this project was only partially successful in achieving the goals set forth for this task. It was not possible, except in medicine and dentistry, to do a quick verification of current assumptions regarding in-state retention of health professions graduates. This failure was due to the lack of sufficient and reliable data on New Jersey graduates.

A methodology developed and implemented by DHE to collect sound data on a state level through a centralized data collection activity was also only partially successful. However, the exercise did result in the compilation of some useful data and experience suggested an alternative approach that could be more successful.

Task 4: Develop a Methodology to Implement a Series of Health Manpower Projections

Sub-task a: Develop and present graphic displays of the projections in a prototype format.

Appendix IV of this final report provides the format designed for presentation of the results of New Jersey's projections of health manpower requirements for the future. In tabular form, projections of supply, demand and manpower need (demand minus supply) are presented. Manpower need is calculated from the midpoint of the demand projection. A second presentation format involves the graphing of manpower supply and demand over time (from 1975 to 1985). This technique creates strategy lines for each profession which specify when, if ever, a balance between supply and demand is expected during the projection period. These strategy lines are useful in developing policies to affect the growth in future manpower supply.

Sub-task b: Provide the results of alternative models.

In the narrative for Task 4, three different methods of projection of demand for health professionals are documented. The first method, which was used for the licensed health professions, analyzes the relationship of current distribution to a number of variables (population, income, age, etc.) using stepwise regression analysis. This is an econometric modeling technique. The second method is a ratio model in which the utilization of dental auxiliaries by dentists is used as the projection base for the future demand for auxiliaries. The third method is also based on a series of regressions, however, the variables used in this model are institution parameters rather than demographic variables. This model was developed for the non-licensed health professions, as sound distributional data on these professions are not available in New Jersey. Moreover, the majority of these people are employed in institutional settings, predominately hospitals. Therefore, the distribution of service center hours (i.e., respiratory, therapy hours) by hospital served as the dependent variable of the regression, while data on admissions, beds, wages, length of stay, and non-payroll expenditures were used as independent variables. A fourth model discussed in Appendix IV is a linear programming model which was used to develop theoretical projections of the demand for physician's assistants and nurse practitioners in a least cost delivery system. Also, the technique for the projection of future supply of health professionals is documented in the task narrative. One area of this sub-task was not successfully completed, that was the development of a health status model for projecting manpower need. A number of months were spent attempting to relate the utilization of health services in New Jersey to health status oriented variables. Among the variables tested were distributional data on age, race, ethnicity, educational background, mortality, infant mortality, and other vital statistics. Staff was unable to develop a statistically significant projection equation based on these variables.

Sub-task c: Adapt the projections to HSA boundaries.

During the contract period, a method for adopting the statewide projections to HSA boundaries was developed. It is based on the application of the local data to the statewide demand projection equations. On the supply side, there are certain assumptions which cause limitations in the accuracy of local projections of supply. While it is our intention to move forward in this area, and, at a minimum, develop local projections of supply and demand for physicians and dentists, it should be recognized that the adaptation of the projection results to local HSA configurations was not completed during the project period.

Sub-task d: Develop strategy lines and recommendations for the health professions studied.

A description of the strategy lines developed for each of the health professions studied during the project is provided in the sub-task (a) narrative above. Using these projections, an analysis of the future scope and cost of health professions education programs in New Jersey. This analysis (Appendix V) provides specific recommendations and policy alternatives for the consideration of the Board of Higher Education. While not completed yet, staff is also beginning to develop recommendations based on the projection results which will be integrated with the qualitative recommendations of the Health Professions Education Master Plan.

Sub-task e: Documentation of the econometric methodology.

A three step, generally applicable model for the implementation of manpower requirements is provided in the task narrative. This model provides suggestions on the development of baseline data within a state or local planning area; it offers alternative means for use of these data (i.e., long and short run projections); and suggests techniques for implementing health manpower projections and developing educational policy recommendations.

Task summary

While the majority of the project requirements of this task were completed within the contract period, there are two areas of incompleteness remaining. The first involves the creation of a statistically sound model for health manpower demand based on health status data. Due to the time and effort already expended attempting to meet this requirement, we do not intend to develop such a model in the future. Secondly, our projections of supply and demand have not been adapted to HSA configurations, although a model for such adaptation has been developed and presented in this final report. We fully intend to refine our projections to local boundaries at that time when a revised Health Professions Education Master Plan is released. This is not anticipated to occur until the new year.

Task 5: Develop a Methodology for Periodic Assessment and Adjustment of Health Manpower Projections in a State

Sub-task a: Develop mechanisms to assess current labor market conditions.

The purpose of this task was to develop methods to verify the accuracy of the health manpower projections on a continual basis. A verification procedure which includes three major elements is described in the task narrative. The first element to the procedure involves the continuous provision of health manpower and demographic data, and the monitoring of variation between the actual values of such data and the projected values used in developing the original manpower projections. By using a theoretical example of projected population values versus observed population values during a projection period, the task narrative shows the quantitative effect that changes in the variables have on the calculation of future demand for a given health profession. A second element of the verification process involves the provision profession - specific manpower data from the licensure cycle and related manpower surveys. Such data will enable the comparison of projected supply in a given year with the observed supply in that year. It will also provide basic data on the employment situation of health professionals by indicating levels of unemployment for each profession. Finally, a survey of employers is documented to show the level of unmet need (employment opportunities) for selected professions.

Sub-task b: Develop a coordination plan among state-level agencies for the provision of population and economic data.

The completion of this task was addressed early in the contract period. After identification of all data needs for monitoring the health manpower projections data base, the sources of these data were identified. Informal arrangements with each relevant agency were made to insure that the required data would be provided to project staff as such data are published. A description of the general plan which was used to accomplish this data flow requirement is provided in the task narrative.

Sub-task c: A plan for the sampling of employers.

A detailed procedure for selection of health professional employers and telephone surveyeing of these employers has been developed and fully tested. The survey is designed to indicate the current level of employment opportunities for any health profession. As designed, the telephone survey also indicates a number of qualitative factors about employment openings, including salary information, shift (i.e., days or evenings), and hiring preference (by educational credential). By using this technique, it is possible to make quick, inexpensive readings of the labor market condition.

Sub-task d: A plan for continuous flow of health manpower data to the SHPDA and HSAs.

Throughout the two year contract project staff worked closely with the manpower subcommittee of the Technical Advisory Committee on Health Data. In fact, the project director served as chairman of that subcommittee. The manpower subcommittee advises on the continuation of the State's health manpower information system, which was initiated during the first linkage contract awarded to New Jersey. Both the SHPDA and the HSA are represented in this structure. During the past two years, efforts have been made to insure that health manpower data and processed and reported in formats useful to the HSAs. Through these efforts, the State Department of Health which is responsible for health manpower data collection, is now processing all data with geocoded locational information. This means that for the first time in New Jersey, manpower data on the licensed health professions will be available at the local level. Project staff also organized a special study group to analyze and provide commentary on the proposed regulations for the designation of Health Manpower Shortage Areas. This group included representatives of all five New Jersey HSAs and the SHPDA. Once commentary was developed, the group disbanded, but project staff continued to provide technical input to the HSAs in the area of shortage area designation applications. Today, some the State's HSAs are the catalysts behind a number of shortage area proposals, some of which have recently been approved for designation.

Sub-task e: A plan for updates of the data base on health manpower

The final element of the task narrative is a general plan for the continual updates of health manpower data in a state. This plan details how a coordinated health manpower information system should function; what agencies and organizations should be involved; how the goal of a data consortium can be developed; and, what data should be collected; and how it should be processed. Following this plan is a suggested number of policy areas which can be addressed once a data system is implemented.

Task Summary

There are two areas specified in the Scope of Work which were not fully addressed during this task. First, sub-task (a) calls for a survey of employees, the intent of which is assumed to yield hard data on their employability. In beginning to develop this survey, a number of reactions occured. First, as the survey would be made of current employees, it would not result in useful data on their employability or the lack of employment opportunities within a given profession in the labor market. It would also be redundant in terms of the demographic survey designed in Task 1, ongoing CHSS and state run manpower surveys, and the graduate follow-up survey documented in Task 2. Further, project staff felt that the employer survey would provide more reliable and useful data on the labor market. Therefore, we decided aganist developing this employee survey design and recommend that such data collection activities be given the lowest priority. The second area of limitation with regard to the completion of Task 5 concerns updates of clinical resources files. Staff did complete a method for updates of New Jersey's health professions education program inventory, which includes basic information on the clinical affiliations of our health related programs. However, no specific plans were developed for updates of our clinical resources inventory because the resource demands of such an inventory far outweigh its usefulness in all but a few cases. Therefore, New Jersey has developed an efficient approach for the maintenance of a coordinated health manpower data and planning system by its completion of the major elements of this task.

Task 6: Recommendations Concerning the Development of Formal and Informal Relationships among the SHPDA, SHCC and HSAs in a State.

Sub-task a: Develop a method to rework the current data base to HSA configuration.

Early in the project period, staff reprogrammed all its health manpower software to the new health service area boundaries designated for New Jersey. This included our health manpower data from a 1974 licensure survey, our health professions education program inventory, and our clinical resources inventory file. All health manpower reports released subsequent to the designation of the HSAs have provided all local data by county and HSA.

Sub-task b: Develop a plan for the HSAs to coordinate future data sets with the state.

An organizational plan for the involvement of the HSAs in the collection, handling and dissemination of health manpower data in New Jersey is presented in the task narrative. Their involvement will be maintained through HSA representation on the Technical Advisory Committee on Health Data, its subcommittee structure, and the advisory committees of the Department of Higher Education. In addition, this plan examines how health manpower data are used to create projections and how these manpower requirements are coordinated with higher education decision making processes.

Sub-task c: Develop a plan for technical assistance to HSAs for health manpower planning.

The task narrative provides a series of guidelines for the coordination of SHPDAs and HSAs for health manpower planning activities. These guidelines explore areas of commonality between the two organizations and suggest means in which these areas can be addressed in an effective manner. It should be noted that the Task 6 narrative does not suggest technical methods for manpower planning at the HSA level. This was decided in recognition that the discussions of Tasks 1, 4, 5, and 6 provide a comprehensive set of technical suggestions for use in local health manpower planning.

Task Summary

All the work areas specified in Task 6 have been completed in full.

Task 7: Evaluate and Document the Results of the Project

With the submittal of this final comprehensive report the requirements of Task 7 are met.

H. Publications

With the submittal of this comprehensive project report, New Jersey has met the reporting requirements specified in the Scope of Work. As specified under "publishable material" a summary of the history, analysis and accomplishments of this project are included herewith, in a form suitable for publication. Also six progress reports, an annual report and an outline of the final comprehensive report have been submitted to and approved by the Project Officer.

It is felt that the methodologies designed during this project can stand alone as useful information for publication. Accordingly, staff will be preparing a paper for presentation to the APHA at next year's meeting. Full acknowledgement of DHEW's support of New Jersey's health manpower planning activities will be contained in that paper.

I. Future Funding Plan

For Fiscal Year 1979, the Department has approved a permanent position for the Director of the Office for Health Manpower. In the past, all positions in the office were contingent on the availability of outside funding. In addition, interim funds have been obtained to continue all existing positions created for the linkage contract. In Fiscal Year 1980, with the approval of the Department and other appropriate authorities, we anticipate that all staff positions will be made permanent. Thus, the Office will consist of a Director, Assistant Director, Program Officer and Research Technician as well as clerical support personnel. This will insure that the level of manpower planning effort created under the linkage contract will become a permanent part of the Department's responsibilities.

J. Future Manpower Planning Activities

1. Graduate Medical Education Program

With the passage of S-1387, "An Act Establishing a Graduate Medical Education Program in New Jersey", in February, 1978, the Department has assumed responsibility for planning and funding of some graduate medical education programs in the State. This activity will require the development of standards for evaluating existing residency programs; the establishment of guidelines for participation of private non-profit and public hospitals; the determination of the number and type of programs that should be supported in accordance with state manpower needs; and, the monitoring of the expenditure of funds. The Department of Higher Education will be providing staff support to the Advisory Graduate Medical Education Council which was established by law.

2. Physician Loan Redemption Program

It is expected that in early Fiscal Year 1979, the Department will add an additional responsibility for implementing a Physician-Dentist Loan Redemption Program. Assembly Bill No. 263 would establish a program in which medical and dental students will be redeemed up to 85% of their medical and dental indebtedness, if they agree to serve for up to three years in an underserved area. It will be staff's responsibility to work with the Departments of Health, Human Services and Corrections, as well as with local communities, in indentifying such shortage areas to be designated by the State. Departmental staff will also be responsible for the general administration of the program. The bill provides $55,000 for staff support.

3. Department of Labor and Industry Contract

The Department of Higher Education has received a contract from the Department of Labor and Industry for the design of a project for the recruitment and retention in the health occupations of persons from the disadvantaged and chronically unemployed segments of society. The project would integrate CETA job opportunities and training, basic skills remediation, and advanced technical training leading to professionally recognized careers in the health field. It will be based on an identification of those health occupations where manpower projections indicate a need for personnel and which fit the Department of Labor's apprenticeship categories.

The Department of Higher Education has been asked to do the planning for this project, this will involve two major components: (1) manpower planning to determine categories of need and job opportunities; and (2) the design of a training program which would include basic skills remediation, "on the job" training in selected clinical facilities, and formal "pre-professional" training. Such preparation is required for entry into regularly established programs offered by hospitals, community colleges, or vocational-technical school post-secondary programs. The latter would be done in cooperation with collegiate institutions, particularly the College of Medicine and Dentistry of New Jersey and our community colleges.

4. National Center for Health Statistics Contract

The Department may receive a $80,000 one year contract with the National Center for Health Statistics, U.S. Department of Health, Education and Welfare to further develop and conduct a survey of non-licensed health professionals (allied health professions) in N.J. If the negotiations are successful, the survey, which will be used as a national prototype, will determine the employment status, job and geographic mobility, educational background, and other demographic characteristics of these professionals.

During this two year "linkage" contract, we were asked to develop a methodology to collect information on non-licensed health professions. NCHS may request us to further improve the methodology, develop appropriate computer software, and conduct a comprehensive survey in the State. It is our understanding that once the model is fully developed and tested, the National Center for Health Statistics will enter into operational contracts with State Departments of Health (SHPDAS) to collect the data on an ongoing basis.

5. Sub-Contract With Department of Human Services

The Department of Human Services, Division of Mental Health has received a comprehensive three-year manpower development project to identify current problems, compile and analyze data on existing resources and practices, project manpower needs, set objectives for the next several years in a changing service system, and devise methods and strategies to achieve those objectives. The focus of these efforts will be on data collection, problem and policy analysis and development of methodologies and strategies that will both provide interim solutions to immediate problems and set the basis for a comprehensive long-range mental health manpower plan. The Division has discussed possible subcontracting the manpower analysis component of this contract to the Office for Health Manpower.

Appendix I:

Non-licensed Manpower Model Documentation

1976 NCHS Survey of Hospital Staff

INFORMATION RESTRICTIONS. This survey is being conducted under authority of the following legislation:
- Health Services Research, Health Statistics and Medical Libraries Act of 1974 (P.L. 93-353), 42 U.S. Code 242k
- Comprehensive Health Manpower Training Act of 1971 (P.L. 92-157) [illegible] 42 U.S. Code 295 f-2
- Nurse Training Act of 1971 (P.L. 92-158), [illegible] 42 U.S. Code [illegible]
- Comprehensive Employment and Training Act of 1973 (P.L. 93-203) [illegible] Code 3009

The information you provide will be made available for statistical purposes [illegible] to agencies within the Department of Health, Education, and Welfare, the Bureau of Labor Statistics, and to State health planning agencies and Health Systems Agencies designated under Public Law 93-641, for the purposes described in the enclosed letter. Information provided by hospitals administered by Federal agencies (e.g., Department of Defense, Veterans Administration, Indian Health Service, etc.) will be made available to each respective agency. Any additional release of information or publication by NCHS will be in the form of aggregate statistical data. Your [illegible] is voluntary and there is no penalty for declining to participate in whole or in part. Return of this questionnaire [illegible] your agreement to the use and release by NCHS in the manner described above.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION
NATIONAL CENTER FOR HEALTH STATISTICS
5600 FISHERS LANE [illegible] ROCKVILLE, MARYLAND 20852
IN COLLABORATION WITH THE
BUREAU OF HEALTH MANPOWER
AND THE BUREAU OF LABOR STATISTICS

O.M.B. NO. 68-S-76034
APPROVAL EXPIRES 12/31/76

1976 SURVEY OF HOSPITAL STAFF

If the hospital's name and/or mailing address is in error, please correct below:

____

____

____

____

SCOPE OF THE SURVEY *(Sections A, B, and C)*—Include data for your entire hospital and all parts, units, components, institutions, etc., unless otherwise specified. However, do not include any component or unit which has its own separate discharge procedures. All hospitals having 6 or more inpatient beds are included in the survey.

REPORTING DATE—Report information for the last day of the payroll period that includes July 12, 1976. If, because of unusual operating conditions, *(e.g., hospital improvements or other temporary activities)*, this period is not typical, please report for the pay period in which hospital operations most closely approximate the normal and indicate the period selected: ________________

THANK YOU FOR YOUR PARTICIPATION

You may wish to transcribe your responses onto the enclosed duplicate form to maintain a record for your files. Please mail the completed form in the enclosed postage paid envelope.

DEFINITIONS AND INSTRUCTIONS

SECTION A – EMPLOYMENT AND VACANCY INFORMATION

DEFINITIONS: 1. **REGULARLY EMPLOYED PERSONS ON THE PAYROLL**—Persons who work in this hospital on a **PRESCHEDULED** basis. Include persons whose schedule is [illegible] (i.e.) [illegible] work [illegible] the following week or, varying hours every other week, etc.). Exclude persons who work "on call" or on a fee-for-service basis, private duty nurses, unpaid volunteers, and all personnel whose salary is totally financed by outside research grants. *(See also the "INCLUDE" and "EXCLUDE" categories below.)*

In addition to the regularly employed personnel,

INCLUDE *(if on the payroll)*:

- Teaching staff
- Temporarily absent employees *(e.g., illness, vacation, etc.)*
- Trainees *(if on the payroll)* in the occupational categories for which they are paid
- Members of religious orders, *(whether paid or unpaid)*
- Federal, State, or local government employees **ON THE PAYROLL** of hospitals administered by Federal, State, or local governments **RESPECTIVELY**.

EXCLUDE.

- Courtesy or attending staff
- Persons not on this hospital's payroll who provide services through fee for service (based on volume of activity), contract, or another [illegible] payment method
- Persons whose salaries are **SUBSIDIZED IN FULL** by Federal, State, or local governments, schools, or other organizations.
- Private duty nurses
- Volunteer workers
- Persons whose salaries are subsidized IN FULL by Federal, State, or local governments, schools, or other organizations.
- Students and trainees not paid by the hospital

2. PERSONNEL –

A. FULL TIME PERSONNEL

Indicate the **NUMBER** of hours worked per week which describes a **FULL TIME** position for your hospital *(check only one)*

CARD 01
18

1 ☐ 35 or more hours per week 3 ☐ 40 or more hours per week
2 ☐ 37½ or more hours per week 4 ☐ other time interval *(please specify)* ____ hours or more per ____

B. PART TIME—Persons on this hospital's payroll who regularly work less than the number of hours per week that you indicated as being a full-time position.

Report the TOTAL NUMBER of FULL TIME and PART TIME employees on your hospital's payroll **ON ALL SHIFTS** on the survey's reporting date, regardless of whether they were at work on that particular day.

TOTAL FULL TIME ____________ (19-26) TOTAL PART TIME ____________ (21-26)

Please insure that the employees counts reported in Section A, Parts I and II sum to these totals.

3. PERSONS CURRENTLY BEING RECRUITED FOR—Positions which would be filled (funds are available) if qualified applicants could be located. Exclude persons being recruited for positions currently filled but expected to become vacant within 60 days.

INSTRUCTIONS: 1. Please review the definitions provided for each occupation listed in Section A before you begin to complete the questionnaire.

2. Count each employee only once according to the OCCUPATIONAL FUNCTION performed for the largest amount of time. This function MAY NOT be the same as the major field of training and may not reflect the credential held.

3. Report HEALTH ADMINISTRATORS AND MANAGERS *(PRIMARILY concerned with policy making, planning, organizing, staffing, and directing)* regardless of their training *(for example, physicians or registered nurses)* in categories 11 01 through 11 04 *(see page 3)* if that is their **PRIMARY FUNCTION**. However, report the **DIRECTOR AND ASSISTANT DIRECTOR OF NURSING** in category 07 01 *(see page 2)*.

4. Report the COMPTROLLER, BUSINESS AND/OR FINANCIAL MANAGER in category 13 01 *(see page 4)*. Report ALL OTHER NON HEALTH MANAGERS AND OFFICERS *(e.g., store manager, canteen manager)* in category 13 02 *(see page 4)*.

(FOR OFFICE USE ONLY)

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(Count all employees on all shifts on the payroll of the last day of the [illegible] all persons [illegible] on the close of this questionnaire, regardless of whether they were at work on that particular day)

PURPOSE For a majority of the health occupations listed in Section [illegible] Part I, only rough approximations are available of the numbers of persons employed in hospitals. This section will enable more accurate information to be obtained for persons in each of these occupations at the local, State, and national levels.

Card	OCCUPATIONAL TITLE, HEALTH (Count each employee only once according to the function performed for the largest amount of time)		CODE (For internal use only)	NO. OF REGULARLY EMPLOYED PERSONS ON PAYROLL		NO. OF POSITIONS CURRENTLY BEING RECRUITED FOR	
				Full Time	Part-Time	Full Time	Part Time
				(Where none, write zero "0".)			
	MEDICINE AND OSTEOPATHY						
CARD 01	PHYSICIAN (M.D. AND D.O.) (Exclude physicians whose primary function is other than patient care)	Medical intern and resident	01 01	[illegible]	[illegible]	[illegible]	[illegible]
		Fellow	01 02	[illegible]	[illegible]	[illegible]	[illegible]
		Psychiatrist	01 03	[illegible]	[illegible]	[illegible]	[illegible]
		Other physician	01 04	[illegible]	[illegible]	[illegible]	[illegible]
		Total physicians (M.D. and D.O.)	51 05			[illegible]	[illegible]
	DENTISTRY AND RELATED OCCUPATIONS						
	DENTIST	Dental intern and resident	02 01	[illegible]	[illegible]	[illegible]	[illegible]
		Other dentist	02 02	[illegible]	[illegible]	[illegible]	[illegible]
		Total dentists	52 03			[illegible]	[illegible]
	DENTAL HYGIENIST, LICENSED		02 03	[illegible]	[illegible]	[illegible]	[illegible]
	DENTAL ASSISTANT	C.D.A. (Certified by ADAA)	02.04	[illegible]	[illegible]		
		Other dental assistant	02 05	[illegible]	[illegible]		
		Total dental assistants	52.06			[illegible]	[illegible]
	DENTAL LABORATORY TECHNICIAN	C.D.T. (Certified by Nat'l Bd. for Cert. in Dent. Lab. Tech.)	02 06	[illegible]	[illegible]		
		Other dental laboratory technician	02 07	[illegible]	[illegible]		
		Total dental laboratory technicians	52 08			[illegible]	[illegible]
	CLINICAL LABORATORY OCCUPATIONS						
CARD 02	MEDICAL LABORATORY SCIENTIST (Exclude physicians whose primary function is patient care)		03 01	[illegible]	[illegible]	[illegible]	[illegible]
	MEDICAL TECHNOLOGIST	MT, MT(ASCP), RMT (Reg. by AMT, ASCP or ISCLT)	03 02	[illegible]	[illegible]		
		Other medical technologist	03 03	[illegible]	[illegible]		
		Total medical technologists	53 04			[illegible]	[illegible]
	CYTOTECHNOLOGIST	CT (ASCP) (Certified by ASCP)	03 04	[illegible]	[illegible]		
		Other cytotechnologist	03 05	[illegible]	[illegible]		
		Total cytotechnologists	53 06			[illegible]	[illegible]
	HISTOLOGIC TECHNICIAN	HT (ASCP) (Registered by ASCP)	03 06	[illegible]	[illegible]		
		Other histologic technician	03 07	[illegible]	[illegible]		
		Total histologic technicians	53 08			[illegible]	[illegible]
	MEDICAL LABORATORY TECHNICIAN	MLT, MLT(ASCP), RLT (Reg. by AMT, ASCP or ISCLT)	03 08	[illegible]	[illegible]		
		Other medical laboratory technician	03 09	[illegible]	[illegible]		
		Total medical laboratory technicians	53.10			[illegible]	[illegible]
	CERT. LAB. ASSIST. (CLA) (ASCP) (Cert. ASCP)		03 10	[illegible]	[illegible]	[illegible]	[illegible]
	OTHER CLINICAL LAB. ASSISTANTS		03 11	[illegible]	[illegible]	[illegible]	[illegible]
	CLINICAL LABORATORY AIDE		03 12	[illegible]	[illegible]	[illegible]	[illegible]
	DIETARY OCCUPATIONS						
	DIETITIAN	R.D. (Registered by ADA)	04 01	[illegible]	[illegible]		
		Other dietitian and dietetic intern	04 02	[illegible]	[illegible]		
		Total dietitians	54 03			[illegible]	[illegible]
CARD 03	NUTRITIONIST		04 03	[illegible]	[illegible]	[illegible]	[illegible]
	DIETETIC TECHNICIAN		04 04	[illegible]	[illegible]	[illegible]	[illegible]
	DIETETIC ASSISTANT		04 05	[illegible]	[illegible]	[illegible]	[illegible]
	INFORMATION AND COMMUNICATION OCCUPATIONS						
	MEDICAL LIBRARIAN (Report Medical Record Administrator (Medical Record Librarian) in 06.01–06.02)	Certified (Certified by ALA)	05 01	[illegible]	[illegible]		
		Other medical librarian	05 02	[illegible]	[illegible]		
		Total medical librarians	55 03			[illegible]	[illegible]
	MEDICAL LIBRARY ASSISTANT		05 03	[illegible]	[illegible]	[illegible]	[illegible]
	MEDICAL RECORD OCCUPATIONS						
	MEDICAL RECORD ADMINISTRATOR	RRA (Registered by AMRA)	06 01	[illegible]	[illegible]		
		Other medical record administrator	06 02	[illegible]	[illegible]		
		Total medical record administrators	56 03			[illegible]	[illegible]
	MEDICAL RECORD TECHNICIAN	ART (Accredited by AMRA)	06 03	[illegible]	[illegible]		
		Other medical record technician	06 04	[illegible]	[illegible]		
		Total medical record technicians	56 05			[illegible]	[illegible]
	NURSING AND RELATED OCCUPATIONS						
CARD 04	REG. NURSE (Exclude Nurse Pract. & Anesthet.)		07 01	[illegible]	[illegible]	[illegible]	[illegible]
	NURSE PRACTITIONER (R.N. only)		07 02	[illegible]	[illegible]	[illegible]	[illegible]
	NURSE ANESTHETIST (R.N. only)		07 03	[illegible]	[illegible]	[illegible]	[illegible]
	LICENSED PRACT. OR VOC. NURSE		07 04	[illegible]	[illegible]	[illegible]	[illegible]
	WARD CLERK		07 05	[illegible]	[illegible]	[illegible]	[illegible]
	NURSE AIDE, ORDERLY OR ATTENDANT		07 06	[illegible]	[illegible]	[illegible]	[illegible]
	HOME HEALTH AIDE		07 07	[illegible]	[illegible]	[illegible]	[illegible]
	OPERATING ROOM TECHNICIAN	CORT (Certified by AORT)	07 08	[illegible]	[illegible]		
		Other operating room technician	07 09	[illegible]	[illegible]		
		Total operating room technicians	57 10			[illegible]	[illegible]
	OTHER NURSING PERSONNEL (Report psychiatric and mental health aides in categories 10.25 through 10.30)		07 10	[illegible]	[illegible]	[illegible]	[illegible]

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SECTION A, PART I: HEALTH OCCUPATIONS - (Continued)

OCCUPATIONAL TITLE, HEALTH (Code each employee only once according to the function performed for the largest amount of time)		CODE (For internal use only)	NO. OF REGULARLY EMPLOYED PERSONS ON PAYROLL		NO. OF POSITIONS CURRENTLY BEING RECRUITED FOR	
			Full-Time	Part-Time	Full-Time	Part-Time
			(Where none, write zero "0")			
PHARMACY OCCUPATIONS						
REGISTERED PHARMACIST		08 01	[illegible]	[illegible]	[illegible]	[illegible]
PHARMACY TECHNICIAN		08 02	[illegible]	[illegible]	[illegible]	[illegible]
RADIOLOGICAL OCCUPATIONS						
RADIOLOGIC TECHNOLOGIST OR TECHNICIAN	R.T.(ARRT), R.T.(ARTI)(Reg. by ARRT or ARTI)	09 01	[illegible]	[illegible]		
	Other rad. technologist or technician	09 02	[illegible]	[illegible]		
	Total rad. technologist or technicians	59 03			[illegible]	[illegible]
NUCLEAR MEDICINE TECHNOLOGIST OR TECHNICIAN	NM (ASCP) (Registered by ASCP)	09 03	[illegible]	[illegible]		
	Other nuclear medicine technol. or tech.	09 04	[illegible]	[illegible]		
	Total nuclear medicine technol. or tech.	69.05			[illegible]	[illegible]
RADIATION THERAPY TECHNOLOGIST OR TECHNICIAN		09.05	[illegible]	[illegible]	[illegible]	[illegible]
RADIATION MONITOR		09 06	[illegible]	[illegible]	[illegible]	[illegible]
RADIOLOGIC ASSISTANT		09.07	[illegible]	[illegible]	[illegible]	[illegible]
REHABILITATION AND MENTAL HEALTH OCCUPATIONS						
OCCUPATIONAL THERAPIST	O.T.R. (Registered by AOTA)	10 01	[illegible]	[illegible]		
	Other occupational therapist	10 02	[illegible]	[illegible]		
	Total occupational therapists	70.03			[illegible]	[illegible]
OCCUPATIONAL THERAPY ASSISTANT	C.O.T.A. (Certified by AOTA)	10.03	[illegible]	[illegible]		
	Other occupational therapy asst.	10 04	[illegible]	[illegible]		
	Total occupational therapy asst.	70.06			[illegible]	[illegible]
OCCUPATIONAL THERAPY AIDE		10.05	[illegible]	[illegible]	[illegible]	[illegible]
PHYSICAL THERAPIST, LICENSED		10 06	[illegible]	[illegible]	[illegible]	[illegible]
PHYSICAL THERAPY ASSIST. & AIDE		10.07	[illegible]	[illegible]	[illegible]	[illegible]
RESPIRATORY THERAPIST	ARRT (Registered by NBRT)	10 08	[illegible]	[illegible]		
	Other respiratory therapist	10 09	[illegible]	[illegible]		
	Total respiratory therapists	70.10			[illegible]	[illegible]
RESPIRATORY THERAPY TECHNICIAN	CRTT (Certified by NBRT)	10 10	[illegible]	[illegible]		
	Other respiratory therapy technician	10.11	[illegible]	[illegible]		
	Total respiratory therapy technicians	70.12			[illegible]	[illegible]
RESPIRATORY THERAPY ASSIST. & AIDE		10.12	[illegible]	[illegible]	[illegible]	[illegible]
CORRECTIVE THERAPIST	C.C.T. (Certified by ACTA)	10 13	[illegible]	[illegible]		
	Other corrective therapist	10 14	[illegible]	[illegible]		
	Total corrective therapists	70.15			[illegible]	[illegible]
CORRECTIVE THERAPY AIDE		10.15	[illegible]	[illegible]	[illegible]	[illegible]
ART THERAPIST		10 16	[illegible]	[illegible]	[illegible]	[illegible]
MANUAL ARTS THERAPIST		10 17	[illegible]	[illegible]	[illegible]	[illegible]
MUSIC THERAPIST	R.M.T. (Registered by NAMT)	10 18	[illegible]	[illegible]		
	Other music therapist	10 19	[illegible]	[illegible]		
	Total music therapists	70.20			[illegible]	[illegible]
RECREATIONAL THERAPIST	Registered (Registered by NTRS)	10 20	[illegible]	[illegible]		
	Other recreational therapist	10.21	[illegible]	[illegible]		
	Total recreational therapists	70.22			[illegible]	[illegible]
RECREATIONAL THERAPY TECH		10 22	[illegible]	[illegible]	[illegible]	[illegible]
SPEECH PATHOLOGIST AND/OR AUDIOLOGIST	Certified (Certified by ASHA)	10 23	[illegible]	[illegible]		
	Other speech pathologist and/or audiologist	10 24	[illegible]	[illegible]		
	Total speech pathologist and/or audiologist	70 25			[illegible]	[illegible]
PSYCHOLOGIST		10 25	[illegible]	[illegible]	[illegible]	[illegible]
PSYCHIATRIC SOCIAL WORKER		10 26	[illegible]	[illegible]	[illegible]	[illegible]
PSYCHIATRIC AIDE		10 27	[illegible]	[illegible]	[illegible]	[illegible]
OTHER MENTAL HEALTH WORKERS		10 28	[illegible]	[illegible]	[illegible]	[illegible]
MEDICAL SOCIAL WORKER	Master's degree in social work	10 29	[illegible]	[illegible]		
	Baccalaureate degree in any major field	10 30	[illegible]	[illegible]		
	Total medical social workers	70.31			[illegible]	[illegible]
SOCIAL WORK ASSISTANT AND AIDE		10 31	[illegible]	[illegible]	[illegible]	[illegible]
ADMINISTRATIVE OCCUPATIONS (HEALTH)						
HOSPITAL ADMINISTRATOR		11 01	[illegible]	[illegible]	[illegible]	[illegible]
HOSPITAL ASSOCIATE ADMINISTRATOR		11 02	[illegible]	[illegible]	[illegible]	[illegible]
OTHER HEALTH ADMINISTRATORS AND MANAGERS		11 03	[illegible]	[illegible]	[illegible]	[illegible]
ADMINISTRATIVE ASSISTANT		11 04	[illegible]	[illegible]	[illegible]	[illegible]
OTHER HEALTH OCCUPATIONS						
CHIROPRACTOR		12 01	[illegible]	[illegible]	[illegible]	[illegible]
OPTOMETRIST		12 02	[illegible]	[illegible]	[illegible]	[illegible]
PODIATRIST		12 03	[illegible]	[illegible]	[illegible]	[illegible]
ORTHOPTIST		12 04	[illegible]	[illegible]	[illegible]	[illegible]
ORTHOTIST PROSTHETIST		12 05	[illegible]	[illegible]	[illegible]	[illegible]
BRACE MAKER		12 06	[illegible]	[illegible]	[illegible]	[illegible]
ORTHOPEDIC CAST SPECIALIST		12 07	[illegible]	[illegible]	[illegible]	[illegible]
OPTICIAN, DISPENSING AND/OR OPTICAL MECHANIC		12 08	[illegible]	[illegible]	[illegible]	[illegible]

SECTION A, PART I: HEALTH OCCUPATIONS - (Continued)

CARD 8

OCCUPATIONAL TITLE, HEALTH (Count each employee only once according to the function performed for the largest amount of time)			CODE (For internal use only)	NO. OF REGULARLY EMPLOYED PERSONS ON PAYROLL		NO. OF POSITIONS CURRENTLY BEING RECRUITED FOR	
				Full-Time	Part-Time	Full-Time	Part-Time
				(Where none, write zero "0")			
OTHER HEALTH OCCUPATIONS - Cont.							
EMERGENCY MEDICAL TECHNICIAN	Registered (Registered by NREMT)		12.09	[illegible]	[illegible]		
	Other emergency medical technician		12.10	[illegible]	[illegible]		
	Total emergency medical technicians		72.11			[illegible]	[illegible]
ELECTROCARDIOGRAPH TECHNICIAN			12.11	[illegible]	[illegible]	[illegible]	[illegible]
ELECTROENCEPHALOGRAPHIC TECHNICIAN			12.12	[illegible]	[illegible]	[illegible]	[illegible]
OTHER MEDICAL MACHINE TECHNICIANS			12.13	[illegible]	[illegible]	[illegible]	[illegible]
PHYSICIAN'S ASSISTANT	Primary Care	Certified (Certified by NCCPA or NIIMS)	12.14	[illegible]	[illegible]		
		Other primary care P.A.'s	12.15	[illegible]	[illegible]		
		Total primary care P.A.'s	72.16			[illegible]	[illegible]
	Specialist	Surgeon's assistant	12.16	[illegible]	[illegible]	[illegible]	[illegible]
		Orthopaedic physician's assistant	12.17	[illegible]	[illegible]	[illegible]	[illegible]
		Urologic physician's assistant	12.18	[illegible]	[illegible]	[illegible]	100-101
		Other specialist P.A.'s	12.19	[illegible]	[illegible]	[illegible]	[illegible]
		Total specialist P.A.'s	72.20			[illegible]	[illegible]
MEDICAL ASSISTANT			12.20	[illegible]	[illegible]	[illegible]	[illegible]
MEDICAL SECRETARY (Report Non-Medical Secretaries in 17.06)			12.21	[illegible]	[illegible]	[illegible]	[illegible]
MEDICAL TRANSCRIPTIONIST			12.22	[illegible]	[illegible]	[illegible]	[illegible]
OTHER HEALTH PROFESSIONALS NOT REPORTED IN 01.01 THROUGH 12.22			12.23	[illegible]	[illegible]	[illegible]	[illegible]
OTHER HEALTH TECHNICIANS NOT REPORTED IN 01.01 THROUGH 12.23			12.24	[illegible]	[illegible]	[illegible]	[illegible]

CARD 9

SECTION A, PART II: NONHEALTH OCCUPATIONS

PURPOSE: Support provided by nonhealth personnel is an integral part of the daily operation of a hospital. Information on the numbers of such personnel at the local, state, and national levels are virtually nonexistent.

Report all employees on all shifts on the payroll of the last day of the payroll period specified on the cover of this questionnaire, regardless of whether they were at work on that particular day.

Count each employee only once according to the FUNCTION performed for the largest amount of time.

OCCUPATIONAL TITLE, NONHEALTH	CODE (For internal use only)	NUMBER OF REG. EMPLOYED PERSONS ON PAYROLL	
		Full-Time	Part-Time
NONHEALTH MANAGERS AND OFFICERS			
COMPTROLLER, BUSINESS AND/OR FINANCIAL MANAGER	13.01	[illegible]	[illegible]
ALL OTHER NONHEALTH MANAGERS AND OFFICERS	13.02	[illegible]	[illegible]
NONHEALTH PROFESSIONAL & TECH. OCCUPATIONS			
ACCOUNTANT & AUDITOR	14.01	[illegible]	[illegible]
PURCHASING AGENT AND/OR BUYER	14.02	[illegible]	[illegible]
PERSONNEL & LABOR RELATIONS SPECIALIST (e.g., UTILIZATION OFF., JOB ANALYST, POSITION CLASSIFIER, PERS. DIRECTOR)	14.03	[illegible]	[illegible]
SYSTEMS ANALYST, ELECTRONIC DATA PROCESSING	14.04	[illegible]	[illegible]
COMPUTER PROGRAMMER	14.05	[illegible]	[illegible]
ENGINEER (e.g., Chemical, Civil, Industrial, Mechanical, Safety, Electrical, or Electronic)	14.06	[illegible]	[illegible]
CHAPLAIN	14.07	[illegible]	[illegible]
ALL OTHER NONHEALTH PROFESSIONALS	14.08	[illegible]	[illegible]

CARD 10

OCCUPATIONAL TITLE, NONHEALTH	CODE (For internal use only)	NUMBER OF REG. EMPLOYED PERSONS ON PAYROLL	
		Full-Time	Part-Time
ALL OTHER NONHEALTH TECHNICIANS	14.09	[illegible]	[illegible]
SERVICE WORKER OCCUPATIONS			
SUPERVISOR, NONWORKING-SERVICE ONLY	15.01	[illegible]	[illegible]
WASHER, MACHINE AND/OR STARCHER	15.02	[illegible]	[illegible]
LAUNDRY MACHINE PRESSER	15.03	[illegible]	[illegible]
SEWER, CUSTOM (SEAMSTRESS)	15.04	[illegible]	[illegible]
JANITOR, PORTER AND CLEANER	15.05	[illegible]	[illegible]
GARDENERS AND GROUNDSKEEPERS	15.06	[illegible]	[illegible]
GUARD AND DOORKEEPER	15.07	[illegible]	[illegible]
COOK, INSTITUTION	15.08	[illegible]	[illegible]
COOK, SHORT ORDER AND/OR SPECIALTY FAST FOODS	15.09	[illegible]	[illegible]
KITCHEN AREA HELPER	15.10	[illegible]	[illegible]
BAKER, BREAD AND/OR PASTRY	15.11	[illegible]	[illegible]

SECTION A PART II: NONHEALTH OCCUPATIONS (Continued)

OCCUPATIONAL TITLE, NONHEALTH	CODE (For internal use only)	NUMBER OF REG. EMPLOYED PERSONS ON PAYROLL	
		Full-Time	Part-Time
SERVICE WORKER OCCUPATIONS - Cont.			
ALL OTHER FOOD SERVICE WORKERS (e.g., Waiter, Waitress, Diet Maid, Bus Boy)	15.12	38-39	40-41
CHILD CARE WORKER	15.13	42-43	44-45
ALL OTHER SERVICE WORKERS *(e.g., ELEVATOR OPERATORS)*	15.14	46-47	48-49
SALES OCCUPATIONS			
SALES PERSON, SALES CLERK, AND OTHER SALES OCCUPATIONS	16.01	50-51	52-53
CLERICAL OCCUPATIONS			
CLERICAL SUPERVISOR	17.01	54-55	56-57
SWITCHBOARD OPERATOR	17.02	58-59	60-61
RECEPTIONIST AND/OR HOSPITAL ADMITTING CLERK	17.03	62-63	64-65
SWITCHBOARD OPERATOR-RECEPTIONIST	17.04	66-67	68-69
SECRETARY *(REPORT MEDICAL SECRETARIES IN 17.21)*	17.05	70-71	72-73
STENOGRAPHER	17.06	74-75	76-77
TYPIST (INCL. CLERK-TYPIST)	17.07	78-79	80-81
FILE CLERK	17.08	82-83	84-85
GENERAL CLERK	17.09	86-87	88-89
PAYROLL AND/OR TIMEKEEPING CLERK	17.10	90-91	92-93
PERSONNEL CLERK	17.11	94-95	96-97
BOOKKEEPER, HAND	17.12	98-99	100-101
ACCOUNTING CLERK	17.13	102-103	104-105
BOOKKEEPING & BILLING-MACHINE OPERATOR	17.14	106-107	108-109
COMPUTER OPERATOR	17.15	110-111	112-113
KEYPUNCH OPERATOR	17.16	114-115	116-117
PERIPHERAL EDP EQUIPMENT OPERATOR	17.17	14-15	16-17
ALL OTHER OFFICE MACHINE OPERATORS	17.18	18-19	20-21
STATISTICAL CLERK	17.19	22-23	24-25
CASHIER	17.20	26-27	28-29
INSURANCE CLERK HOSPITALIZATION	17.21	30-31	32-33

CARD 11

OCCUPATIONAL TITLE, NONHEALTH	CODE (For internal use only)	NUMBER OF REG. EMPLOYED PERSONS ON PAYROLL	
		Full-Time	Part-Time
CLERICAL OCCUPATIONS - Cont.			
SHIPPING AND/OR RECEIVING CLERK	17.22	34-35	36-37
STOCK CLERK, STOCK ROOM	17.23	38-39	40-41
ALL OTHER CLERICAL WORKERS	17.24	42-43	44-45
MAINTENANCE, REPAIR, MATERIAL HANDLING, AND POWER PLANT OCCUPATIONS			
SUPERVISOR, NONWORKING	18.01	46-47	48-49
CARPENTER	18.02	50-51	52-53
ELECTRICIAN	18.03	54-55	56-57
MECHANIC, AUTOMOTIVE AND TRUCK	18.04	58-59	60-61
MECHANIC, MAINTENANCE	18.05	62-63	64-65
ELECTROMEDICAL EQUIPMENT REPAIRER	18.06	66-67	68-69
ALL OTHER MECHANICS AND REPAIRERS	18.07	70-71	72-73
PAINTER	18.08	74-75	76-77
PLUMBER AND/OR PIPEFITTER	18.09	78-79	80-81
MAINTENANCE REPAIRER, GENERAL UTILITY	18.10	82-83	84-85
HELPER, TRADES	18.11	86-87	88-89
STATIONARY ENGINEER	18.12	90-91	92-93
FIRER, STATIONARY BOILER	18.13	94-95	96-97
AMBULANCE DRIVER	18.14	98-99	100-101
TRUCK DRIVER	18.15	102-103	104-105
ALL OTHER SKILLED CRAFTS AND KINDRED WORKERS	18.16	106-107	108-109
ALL OTHER OPERATIVES AND SEMISKILLED WORKERS	18.17	110-111	112-113
ALL OTHER LABORERS AND UNSKILLED WORKERS	18.18	114-115	116-117

PLEASE REPORT ANY PROBLEMS YOU ENCOUNTERED IN COMPLETING THIS SECTION OF THE QUESTIONNAIRE:

SECTION B - PATIENT CARE SERVICES PERFORMED BY [illegible]SONNEL NOT ON THIS HOSPITAL'S PAYROLL

PURPOSE. Due to the increased usage of services provided by per[illegible] not on a hospital's payroll, the staffing information you provided in Section A may not reflect the true volume of services rendered [illegible] patients. This section is included in an attempt to explain the variation in staffing patterns which may exist between hospitals of the [illegible] type and size.

DEFINITIONS. PERSONNEL NOT ON THIS HOSPITAL'S PAYROLL—includes those from whom services are obtained through contract, fee-for-service, (based on volume of activity) or another non-payroll payment method.

INSTRUCTIONS. For each of the services listed below, please enter an "X" in the YES or NO column as appropriate.

1. "YES" in column (1) indicates that SOME or ALL of the service during the past 12 months was performed by NONHOSPITAL personnel.

   "NO" in column (2) indicates that,

   a) All of the service was PERFORMED BY HOSPITAL PERSONNEL or,

   b) The service is NOT PROVIDED by the hospital.

2. If YES, give your BEST ESTIMATE of the service's TOTAL VOLUME OF ACTIVITY (either employee-hours, number of patients, procedures, items serviced, or money spent) provided by personnel not on this hospital's payroll. Make this estimate in a manner which is most readily available to you (i.e., employee-hours, number of patients, procedures, items, or money).

3. EXCLUDE THE FOLLOWING.

   a) Services not directly related to patient care such as laundry and housekeeping services, T.V. rentals, and management consulting.

   b) Services rendered by physicians [illegible]

   c) Services provided on a CONSULTANT basis ONLY

   d) Services provided to persons treated at other health facilities.

CARD 12

PATIENT CARE SERVICE (NONPHYSICIAN)	YES, service performed by non hospital personnel	NO	If yes, mark with an "x" the volume of activity provided during the past 12 months by personnel not on this hospital's payroll			
			1% TO 24%	25% TO 49%	50% TO 74%	75% OR MORE
CODE →	(1)	(2)	(1)	(2)	(3)	(4)
1. Anesthesia						
2. Clinical Laboratory						
3. Dental						
4. Dietary						
5. Emergency Room						
6. Emergency Transportation						
7. Medical Records						
8. Occupational Therapy						
9. Pharmacy						
10. Physical Therapy						
11. Podiatry						
12. Psychology						
13. Radiology (therapy and diagnosis)						
14. Registered Nursing						
15. Respiratory Therapy						
16. Social Work						
17. Other (Specify)						
18. Other (Specify)						

POS 60-80 - BLANKS

SECTION C – INPATIENT NURSING UNIT CHARACTERISTI AND PERSONNEL

NOTE: Based on past experience it was observed that the Director of [illegible]ing or the Nursing Department might have more immediate access to the information requested in this section.

PURPOSE. The information obtained by this section will be used to describe the distribution of personnel assigned to various inpatient nursing units who are providing various types of care to inpatients.

DEFINITIONS OF UNITS

Unit 1 - Intensive care and/or coronary care units: A special unit in which patients are concentrated by reason of serious illness, with or without regard to diagnosis. Special lifesaving techniques and equipment are immediately available and patients are under continuous observation by nursing staff. Include burn care and respiratory acute care units.

Unit 2 - General medical/surgical units: Inpatient adult bed units established primarily for nursing care of patients in acute phase of illness. Report units established for pediatric care in Unit 4.

Unit 3 - Extended care or self care units - Inpatient adult bed units established solely for patients not in an acute phase of illness but who require primary convalescent or restorative care or, who are ambulatory but must remain hospitalized. Include long term psychiatric units. Alternate unit titles: ambulatory care, intermediary, long term care, nursing home care.

Unit 4 - Other inpatient bed units - Units providing inpatient bed care but not classified in categories above.

Examples of units to include:

Alcoholism
Chronic Disease
Drug Addiction
Maternity

Neonatal
Obstetric
Pediatric
Psychiatric (other than long term)

Rehabilitation
[illegible]
Tuberculosis

INSTRUCTIONS, PART I:

1. Report or estimate inpatient nursing unit characteristics specified in the table heading for the last 24 hour day of the payroll period specified on the front page of this questionnaire.
2. Enter a zero (0) in the appropriate spaces when the hospital does not have a specified type of nursing unit.
3. **EXCLUDE:** The emergency room, operating (surgery) room, and recovery room from any information reported.
4. Include data for inpatient nursing units in your entire hospital and all parts, components, institutions, etc., unless otherwise specified. However, do not include any component or inpatient nursing unit having its own separate discharge procedures.

SECTION C, PART I INPATIENT NURSING UNIT CHARACTERISTICS

CARD 12

TYPE OF INPATIENT NURSING UNIT	NURSING UNIT CHARACTERISTICS (Where none, write "0")					
	NUMBER OF UNITS OF THIS TYPE	NUMBER OF BEDS (Total in all units of this type)	PATIENT CENSUS (Total in all units of this type)	AVERAGE LENGTH OF STAY IN THIS TYPE OF UNIT		
				30 Days or More (Mark X)	Less Than 30 Days	
					Days	Hours
UNIT 1 Intensive care and/or coronary care unit	60-61	62-65	66-69	70	71-72	73-74
UNIT 2 General medical/surgical unit	75-76	77-80	81-84	85	86-87	88-89
UNIT 3 Extended care or self-care unit	90-91	92-95	96-99	100	101-102	103-104
UNIT 4 Other inpatient bed units (Specify below)	105-106	107-110	111-114	115	116-117	118-119

Please list the functional categories (types) of the nursing units you included in Unit 4, "Other inpatient bed units":

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SECTION C, PART II - INPATIENT NURSING UNIT PERSONNEL

DEFINITIONS, PART II (in alphabetical order)

Full time, part time, positions currently being recruited for—see the front page of the questionnaire.

Clinical specialist (RN) - Expert nurse clinician with particular knowledge, skill and competence in specialized area of nursing who serves as consultant to nurses in specific practice areas independent of administrative nurse direction, and/or provides direct specialized care to patients.

Float personnel - Personnel who are not assigned to one specific nursing unit, but are assigned to units of the same or different types as needed. These personnel are to be reported only at the end of Section C, Part II, in the category entitled: "NURSING UNIT PERSONNEL NOT ASSIGNED TO ONE SPECIFIC UNIT."

Head nurse or assistant head nurse (RN) - Directs and supervises nursing service for only one specific inpatient care unit. Include R.N.'s whose duties are regularly those of a charge nurse.

Licensed practical or vocational nurse - Nurses who work under the supervision of registered nurses and/or physicians, are graduates of State approved schools of practical nursing and are currently licensed (LPN or LVN) to practice in your State, or granted a license by waiver on the basis of experience and endorsement, rather than upon completion of a prescribed course of study.

Nursing aide, orderly, or attendant - Assists the nursing staff by performing routine duties in caring for patients, under the direct supervision of a nurse. Include psychiatric aides.

Other nursing unit personnel - Personnel not included elsewhere who regularly work in an inpatient nursing unit (e.g., may include nursing or medical technicians, coronary care technicians and other personnel regularly working in an inpatient nursing unit). Please specify the job titles of such personnel.

Other RN personnel - Other registered nurses who are assigned patient care duties, not identified elsewhere in the unit (Units 1, 2, 3, or 4). Please specify the job titles of such registered nurses.

Registered nurse - Nurse currently licensed in your State or awaiting licensure who is responsible for the nature and quality of all nursing care that patients receive.

Staff nurse (RN) - Responsible for the direct and indirect total nursing care of patients. Include general duty and team leaders.

Supervisor and/or assistant supervisor (Non-RN) - Personnel who are not RN's but direct and supervise nursing personnel for two or more inpatient care units of the same type or of different types.

Supervisor or assistant supervisor (RN) - Directs and supervises nursing service for two or more inpatient care units of the same type or of different types.

Ward clerk - Handles routine clerical and reception work in a given nursing unit by receiving patients and visitors, scheduling appointments, and maintaining the location of all ward staff. Alternate title: Unit clerk; ward manager.

ASSIGNING PERSONNEL TO UNITS.

A. Report employees in one of the following units ONLY if they function in one specific unit for at least 75% of their working time.

Unit 1 - Intensive care and/or coronary care unit
Unit 2 - General medical and/or surgical unit
Unit 3 - Extended care and/or self-care unit
Unit 4 - Other inpatient bed unit

B. Report ALL OTHER nursing unit personnel, who work in more than one unit of the same or of a different type, in the last category entitled: "NURSING UNIT PERSONNEL NOT ASSIGNED TO ONE SPECIFIC UNIT." Such personnel are assigned to units as needed (e.g., to meet shortages caused by regular staff who do not report to work or, because of an overload of patients not requiring a particular type of care).

SECTION C, PART II - INPATIENT NURSING UNIT PERSONNEL

Report all employees on all shifts, on the payroll, of the last day of the payroll period specified on the cover of the questionnaire, regardless of whether they were at work on that particular day.

OCCUPATIONAL FUNCTION, BY TYPE OF UNIT (Count each employee only once according to the FUNCTION performed for the largest amount of time) EXCLUDE Registered Nurses and other personnel whose PRIMARY FUNCTION is other than PATIENT CARE (e.g., administration, research, training, etc.)		CODE (For internal use only)	NO. OF REGULARLY EMPLOYED PERSONS ON PAYROLL		NO. OF POSITIONS CURRENTLY BEING RECRUITED FOR	
			Full-Time	Part-Time	Full-Time	Part-Time
			(Where none, write zero '0'.)			
UNIT 1 - INTENSIVE CARE AND/OR CORONARY CARE UNIT						
CARD 13 REGISTERED NURSE	CLINICAL SPECIALIST	111	14-16	17-19	20-21	22-23
	HEAD NURSE OR ASSISTANT HEAD NURSE	112	24-26	27-29	30-31	32-33
	STAFF NURSE	113	34-36	37-39	40-41	42-43
	OTHER R.N.s (Specify) ____	114	44-46	47-49	50-51	52-53
LICENSED PRACTICAL OR VOCATIONAL NURSE		121	54-56	57-59	60-61	62-63
NURSING AIDE, ORDERLY, OR ATTENDANT		131	64-66	67-69	70-71	72-73
WARD CLERK		141	74-76	77-79	80-81	82-83
OTHER NURSING UNIT PERSONNEL NOT INDICATED ABOVE (Specify) ____		151	84-86	87-89	90-91	92-93
____		161	94-96	97-99	100-101	102-103
UNIT 2 - GENERAL MEDICAL AND/OR SURGICAL UNIT						
CARD 14 REGISTERED NURSE	HEAD NURSE OR ASSISTANT HEAD NURSE	212	[illegible]	[illegible]	[illegible]	[illegible]
	STAFF NURSE	213	[illegible]	[illegible]	[illegible]	[illegible]
	OTHER R.N.s (Specify) ____	214	[illegible]	[illegible]	[illegible]	[illegible]
	____	215	[illegible]	[illegible]	[illegible]	[illegible]
LICENSED PRACTICAL OR VOCATIONAL NURSE		221	[illegible]	[illegible]	[illegible]	[illegible]
NURSING AIDE, ORDERLY, OR ATTENDANT		231	[illegible]	[illegible]	[illegible]	[illegible]
WARD CLERK		241	[illegible]	[illegible]	[illegible]	[illegible]
OTHER NURSING UNIT PERSONNEL NOT INDICATED ABOVE (Specify) ____		251	[illegible]	[illegible]	[illegible]	[illegible]
____		261	[illegible]	[illegible]	[illegible]	[illegible]

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SECTION C, PART II INPATIENT NURSING UNIT PERSONNEL - (Continued)

Report all employees on all shifts, on the payroll, of the last day of the ... period specified on the cover of this questionnaire, regardless of whether they were at work on that particular day

	OCCUPATIONAL FUNCTION, BY TYPE OF UNIT (Count each employee only once according to the FUNCTION performed for the largest amount of time)		CODE (For internal use only)	NO. OF REGULARLY EMPLOYED PERSONS ON PAYROLL		NO. OF POSITIONS CURRENTLY BEING RECRUITED FOR	
				Full-Time	Part-Time	Full-Time	Part-Time
				(Where none, write zero "0")			
	UNIT 3 - EXTENDED CARE AND/OR SELF CARE UNIT						
CARD 15 CARD 16	REGISTERED NURSE	HEAD NURSE OR ASSISTANT HEAD NURSE	312	[illegible]	[illegible]	[illegible]	[illegible]
		STAFF NURSE	313	[illegible]	[illegible]	[illegible]	[illegible]
		OTHER R.N.s (Specify).					
			314	[illegible]	[illegible]	[illegible]	[illegible]
			315	[illegible]	[illegible]	[illegible]	[illegible]
	LICENSED PRACTICAL OR VOCATIONAL NURSE		321	[illegible]	[illegible]	[illegible]	[illegible]
	NURSING AIDE, ORDERLY, OR ATTENDANT		331	[illegible]	[illegible]	[illegible]	[illegible]
	WARD CLERK		341	[illegible]	[illegible]	[illegible]	[illegible]
	OTHER NURSING UNIT PERSONNEL NOT INDICATED ABOVE (Specify):						
			351	[illegible]	[illegible]	[illegible]	[illegible]
			361	[illegible]	[illegible]	[illegible]	[illegible]
	UNIT 4 - OTHER INPATIENT BED UNITS						
CARD 16	REGISTERED NURSE	HEAD NURSE OR ASSISTANT HEAD NURSE	412	[illegible]	[illegible]	[illegible]	[illegible]
		STAFF NURSE	413	[illegible]	[illegible]	[illegible]	[illegible]
		OTHER R.N.s (Specify).					
			414	[illegible]	[illegible]	[illegible]	[illegible]
			415	[illegible]	[illegible]	[illegible]	[illegible]
	LICENSED PRACTICAL OR VOCATIONAL NURSE		421	[illegible]	[illegible]	[illegible]	[illegible]
	NURSING AIDE, ORDERLY, OR ATTENDANT		431	[illegible]	[illegible]	[illegible]	[illegible]
	WARD CLERK		441	[illegible]	[illegible]	[illegible]	[illegible]
	OTHER NURSING UNIT PERSONNEL NOT INDICATED ABOVE (Specify):						
			451	[illegible]	[illegible]	[illegible]	[illegible]
			461	[illegible]	[illegible]	[illegible]	[illegible]
	NURSING UNIT PERSONNEL NOT ASSIGNED TO ONE SPECIFIC UNIT						
CARD 17	CLINICAL SPECIALIST (R.N.)		511	[illegible]	[illegible]	[illegible]	[illegible]
	SUPERVISOR OR ASSISTANT SUPERVISOR	R.N.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		NON-R.N.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	FLOAT PERSONNEL	REGISTERED NURSE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		LIC. PRAC. OR VOC. NURSE	521	[illegible]	[illegible]	[illegible]	[illegible]
		NURSING AIDE, ORDERLY OR ATTENDANT	531	[illegible]	[illegible]	[illegible]	[illegible]
		WARD CLERK	541	[illegible]	[illegible]	[illegible]	[illegible]
		OTHER NURSING UNIT PERSONNEL (Specify)					
			551	[illegible]	[illegible]	[illegible]	[illegible]
			561	[illegible]	[illegible]	[illegible]	[illegible]

PLEASE REPORT ANY PROBLEMS YOU ENCOUNTERED IN COMPLETING THIS SECTION OF THE QUESTIONNAIRE:

If questions arise concerning your response, whom should we contact?

NAME	TITLE	TELEPHONE	DATE COMPLETED

PLEASE RETURN THIS QUESTIONNAIRE IN THE POSTAGE PAID ENVELOPE ENCLOSED
THANK YOU FOR YOUR PARTICIPATION

HRA 1[illegible] (Page 7 of 8)
REV 8-76

1977 NCHS Survey of Hospital Staff

CONFIDENTIAL: Information contained on this form which would permit identification of any individual or establishment has been collected with a guarantee that it will be held in strict confidence, will be used only for purposes stated in the covering letter to the questionnaire, and will not be disclosed or released to others without the consent of the individual or the establishment in accordance with Section 308(d) of the Public Health Service Act (42 USC 242m).

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION
NATIONAL CENTER FOR HEALTH STATISTICS
3600 FISHERS LANE, ROCKVILLE, MARYLAND 20857
IN COLLABORATION WITH THE
BUREAU OF HEALTH MANPOWER
AND THE BUREAU OF LABOR STATISTICS

O.M.B. No. 68 S-76034
Approval Expires 10/31/77

1977 SURVEY OF HOSPITAL STAFF

If the hospital's name and/or mailing address is in error, please correct below:

____
____
____
____

1. This questionnaire is divided into the following four sections:

SECTION A - PERSONNEL ON HOSPITAL'S PAYROLL
SECTION B - PATIENT CARE SERVICES PERFORMED BY PERSONNEL NOT ON THIS HOSPITAL'S PAYROLL
SECTION C - INPATIENT NURSING UNIT CHARACTERISTICS AND PERSONNEL
SECTION D - CHANGES IN HOSPITAL SIZE

BEFORE COMPLETING EACH SECTION OF THE QUESTIONNAIRE, PLEASE REVIEW THE INSTRUCTIONS AND DEFINITIONS PROVIDED, AND ANSWER ITEM 3, PARTS A AND B BELOW.

2. SCOPE OF THE SURVEY (Sections A, B, C, and D) - Include data for your entire hospital and all parts, units, components, institutions, etc., unless otherwise specified. However, do not include any component or unit which has its own separate discharge procedures. All hospitals having 6 or more inpatient beds are included in the survey.

3. PERSONNEL -

A. FULL-TIME - Indicate the NUMBER of hours worked per week which describes a FULL-TIME position for your hospital (check only one):

16
1 ☐ 35 or more hours per week
2 ☐ 37½ or more hours per week
3 ☐ 40 or more hours per week
4 ☐ other time interval (please specify)
______ hours or more per ______

CARD 01

B. PART-TIME - Persons on this hospital's payroll who regularly work less than the number of hours per week that you indicated as being a full-time position.

Report the TOTAL NUMBER of FULL-TIME and PART-TIME employees on your hospital's payroll ON ALL SHIFTS on the survey's reporting date, regardless of whether they were at work on that particular day:

TOTAL, FULL-TIME: ________ 17-20 TOTAL, PART-TIME: ________ 21-24

Please insure that the employee counts reported in Section A, Parts I and II sum to these totals.

THANK YOU FOR YOUR PARTICIPATION

You may wish to transcribe your responses onto the enclosed duplicate form to maintain a record for your files. Please mail the completed form in the enclosed postage-paid envelope.

FOR OFFICE USE ONLY

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SECTION A INSTRUCTIONS

PERSONNEL ON HOSPITAL'S PAYROLL

1. In completing this section of the questionnaire, include all persons *(full-time and part-time)* on the payroll of this hospital during your last pay period. Part 1 is for Patient Care Personnel and Part 2 is for Non-patient Care Personnel. This refers to workers whose schedule is sporadic as well as those on a regular schedule.

   In addition to the regularly employed personnel:

   INCLUDE *(if on your hospital's payroll)*:

   - Teaching staff
   - Temporarily absent employees *(e.g., illness, vacation, etc.)*
   - Trainees *(if on the payroll in the occupational categories for which they are paid)*
   - Members of religious orders *(whether paid or unpaid)*
   - Federal, State, or local government employees ON THE PAYROLL of hospitals administered by Federal, State, or local governments RESPECTIVELY.

   EXCLUDE:

   - Courtesy or attending medical staff members
   - Other persons who provide services through an "on-call" or fee-for-service *(based on volume of activity)*, contract, or another non-payroll payment method
   - Persons whose salaries are SUBSIDIZED IN FULL by Federal, State, or local governments, schools, or other organizations
   - Private duty nurses
   - Volunteer workers
   - Students and trainees NOT paid by the hospital.

2. Report each employee only once according to the OCCUPATIONAL FUNCTION customarily performed for the greatest amount of time. These duties may differ from the worker's major field of training or may not reflect the credentials held. The Glossary Code Numbers in this section that appear to the left of the occupational titles on this questionnaire correspond to the numbers shown on the GLOSSARY OF OCCUPATIONAL DEFINITIONS. Please review those definitions before you begin to complete this questionnaire.

3. Report HEALTH ADMINISTRATORS AND MANAGERS *(primarily concerned with policy making, planning, organizing, staffing, and directing)* regardless of their training *(for example, physicians or registered nurses)* in categories 11.01 and 11.02-11.03 if administration or management is their PRIMARY FUNCTION.

4. Report the DIRECTOR AND ASSISTANT DIRECTOR OF NURSING in category 07.01-07.03.

5. Report the COMPTROLLER, BUSINESS AND/OR FINANCIAL MANAGER in category 13.01.

6. Report ALL OTHER NON PATIENT CARE MANAGERS AND OFFICERS *(e.g., store manager, canteen manager)* in category 13.02.

SECTION A. PART 1: PATIENT CARE PERSONNEL ON PAYROLL (Include both full-time and part-time employees)

	Glossary Code Numbers	Occupational Title	Number on Payroll	
			Full-time	Part-time
CARD 01	01.01-01.04	Physicians (M.D. & D.O.): (Include interns, residents, fellows & psychiatrists whose primary function is patient care)	61	63
	02.01-02.02	Dentistry & Related Occupations: Dentists (Include interns & residents)	61	63
	02.03-02.07	Dental Auxiliaries (Include dental hygienists, assistants & lab. techs.	113	115
CARD 02	03.01	Clinical Lab. Occupations: Medical Lab. Scientists	14	16
	03.02-03.03	Medical Technologists	30	32
	03.04-03.05	Cytotechnologists	42	44
	03.06-03.07	Histologic Technicians	54	56
	03.08-03.09	Medical Laboratory Techs.	66	68
	03.10	Cert. Lab. Assts. (ASCP Certified)	70	72
	03.11-03.12	Other Lab. Assts. & Aides	90	92
	04.01-04.03	Dietary Occupations: Dietitians/Nutritionists	110	112
CARD 03	04.04-04.05	Dietetic Technicians/ Assistants	26	28
	05.01-05.03	Medical Librarians (Report med. record librarians in 06.01-06.02)	46	48
	06.01-06.02	Medical Record Occupations: Medical Record Admins.	58	60
	06.03-06.04	Medical Record Technicians	70	72
	07.01-07.03	Nursing & Related Occupations: Registered Nurses	99	101
	07.04	Licensed practical or vocational nurses	103	107
CARD 04	07.05	Ward Clerks	14	16
	07.06	Nurs. Aides, Orderlies, or Attendants	22	24
	07.07	Home Health Aides	35	37
	07.08-07.09	Operating Room Technicians	51	53
	07.10	Other Nursing Personnel (Report psych. & mental health workers in 10.01-10.15)	55	57
	08.01	Pharmacy Occupations: Registered Pharmacists	63	65
	08.02	Pharmacy Technicians	71	73
	09.01-09.02	Radiological Occupations: Radiologic Technicians or Technologists	87	89
	09.03-09.04	Nuclear Med. Technicians or technologists	99	101
	09.05	Radiation Therapy Technicians or Technologists	103	105
CARD 05	09.06-09.07	Other Radiologic Personnel	18	20

	Glossary Code Numbers	Occupational Title	Number on Payroll	
			Full-time	Part-time
CARD 05	10.01-10.02	Rehabilitation and Mental Health Occupations: Occupational Therapists	30	32
	10.03-10.04	Occupational Therapy Assistants	42	44
	10.05	Occupational Therapy Aides	46	48
	10.06	Physical Therapists-Licensed	54	56
	10.07	Physical Therapy Assts. & Aides	62	64
	10.08-10.09	Respiratory Therapists	78	80
	10.10-10.11	Respiratory Therapy Technicians	90	92
	10.12	Respiratory Aides & Assistants	94	96
	10.13-10.14	Corrective Therapists	110	112
CARD 06	10.18-10.19	Music Therapists	46	48
	10.20-10.21	Recreational Therapists	58	60
	10.23-10.24	Speech Pathologists and/ or Audiologists	78	80
	10.25	Psychologists	82	84
	10.26	Psychiatric Social Workers	90	92
	10.15-17 10.22 10.27-28	Other Mental Health Workers	110	112
	10.29-10.30	Medical Social Workers	22	24
	10.31	Social Work Assts. & Aides	26	28
CARD 07	11.01	Administrative Occupations: (Health) Hospital Administrators	34	36
	11.02-11.03	Other Health Administrators and Managers	54	56
	11.04	Administrative Assts.	58	60
	12.04	Other Health Occupations: Orthoptists	30	32
CARD 08	12.05-12.07	Orthotists-Prosthetists/ Brace maker/orthopedic cast specialists	18	20
	12.09-12.10	Emergency Medical Technicians	38	40
	12.11	Electrocardiograph Technicians	42	44
	12.12	Electroencephalographic Technicians	50	52
	12.13	Other Medical Machine Technicians	58	60
	12.14-12.15	Physician's Assistants- Primary Care	74	76
	12.16-12.19	Physician's Assistants- Specialists	110	112
CARD 09	12.20	Medical Assistants	14	16
	12.01-12.03, 12.23	Other Health Professionals Not reported above	42	44
	12.08, 12.21, 12.22, 12.24	Other Health Technicians Not reported above	50	52

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CTION A PART 2: NON-PATIENT CARE PERSONNEL ON PAYROLL (Include full-time and part-time employees)

Glossary Code Numbers	Occupational Title	Number on Payroll	
		Full-time	Part-time
13.01	Managers and Officers: Comptroller Business/ or Financial Managers	54	56
13.02	All other Non-Patient Care Managers & Officers	58	60
14.01	Professional and Technical Occupations: Accountants & Auditors	62	64
14.02	Purchasing Agents and/or Buyers	66	68
14.03	Personnel and Labor Relations Specialists	70	72
14.04	Systems Analysts, Elect. Data Processors	74	76
14.05	Computer Programmers	78	80
14.06	Engineers (e.g., Chem., Civil, Ind., etc.)	82	84
14.07-14.08	All Other Non-Patient Care Professionals	30	32
14.09	All Other Non-Patient Care Technicians	34	36
15.01	Service Workers Occupations: Supervisor, Nonworking Service Only	98	100
15.02	Washer, Machine and/or Starchers	102	104
15.03	Laundry Machine Pressers	106	108
15.04	Sewers, Custom (Seam- stresses)	110	112
.05	Janitors, Porters, and Cleaners	114	116
.06	Gardeners & Groundskeepers	14	16
15.07	Guards & Doorkeepers	18	20
15.08	Cooks, Institution	22	24
15.09	Cooks, Short Order	26	28
15.10	Kitchen Area Helpers	30	32
15.11	Bakers, Bread and/or Pastry	34	36
15.12	All Other Food Service Workers	38	40
15.13	Child Care Workers	42	44
15.14	All Other Service Workers	46	48
16.01	Sales Occupations: Sales Persons, Sales Clerks & Other Sales	50	52
17.01	Clerical Occupations: Clerical Supervisors	54	56
17.02	Switchboard Operators	58	60
17.03	Receptionists and/or Hospital Admitting Clerks	62	64
17.04	Switchboard Operators- Receptionists	66	68
17.05	Secretaries (Include Medical Secretaries)	70	72
17.06	Stenographers	74	76
17.07	Typists (Include Clerk- Typists and Medical Transcriptionists)	78	80
17.08	File Clerks	82	84
17.09	General Clerks	86	88
17.10	Payroll and/or Time- keeping Clerks	90	92
17.11	Personnel Clerks	94	96
17.12	Bookkeepers, Hand	98	100
17.13	Accounting Clerks	102	104
17.14	Bookkeeping & Billing- Machine Operators	106	108
17.15	Computer Operators	110	112
17.16	Keypunch Operators	114	116
17.17-17.18	All Other Office Machine Operators	18	20
17.19	Statistical Clerks	22	24
17.20	Cashiers	26	28
17.21	Insurance Clerks, Hospitalization	30	32
17.22	Shipping and/or Receiving Clerks	34	36
17.23	Stock Clerks, Stock Room	38	40
17.24	All Other Clerical Workers	42	44
18.01	Maintenance, Repair, Material Handling, & Power Plant Occupations: Supervisors, Nonworking	46	48
18.02	Carpenters	50	52
18.03	Electricians	54	56
18.04	Mechanics, Auto & Truck	58	60
18.05	Mechanics, Maintenance	62	64
18.06	Electromedical Equipment Repairers	66	68
18.07	All Other Mechanics & Repairers	70	72
18.08	Painters	74	76
18.09	Plumbers and/or Pipefitters	78	80
18.10	Maintenance Repairers, General Utility	82	84
18.11	Helpers, Trades	86	88
18.12	Stationary Engineers	90	92
18.13	Firers, Stationary Boiler	94	96
18.14	Ambulance Drivers	98	100
18.15	Truck Drivers	102	104
18.16	All Other Skilled Crafts and Kindred Workers	106	108
18.17	All Other Operatives and Semiskilled Workers	110	112
18.18	All Other Laborers and Unskilled Workers	114	116

CARD 10

CARD 11

SECTION B - PATIENT CARE SERVICES PERFORMED BY PERSONNEL NOT ON THIS HOSPITAL'S PAYROLL

Instructions: For each of the services listed below, place an "X" in the appropriate column to indicate whether or not SOME OR ALL OF THE PATIENT CARE SERVICES in that category were performed by personnel not on this hospital's payroll *(non-hospital personnel)*, i.e., services obtained through contract, fee-for-service *(based on volume of activity)* or another non-payroll payment method.

EXCLUDE THE FOLLOWING:

(a) Services not directly related to patient care such as laundry and housekeeping services, T.V. rentals, and management consulting.

(b) Services rendered by physicians *(if known)*.

(c) Services provided on a CONSULTANT basis ONLY.

(d) Services provided to persons treated at other health facilities.

CARD 12

PATIENT CARE SERVICE (by other than physician)	Was some or all of the specified service performed by non-hospital personnel?	
	YES (1)	NO (2)
1. Anesthesia	14	
2. Clinical Laboratory	16	
3. Dental	18	
4. Dietary	20	
5. Emergency Room	22	
6. Emergency Transportation	24	
7. Emergency Records	26	
8. Occupational Therapy	28	
9. Pharmacy	30	
10. Physical Therapy	32	
11. Podiatry	34	
12. Psychology	36	
13. Radiology (therapy and diagnosis)	38	
14. Registered Nursing	40	
15. Respiratory Therapy	42	
16. Social Work	44	
17. Other (specify): ______________	46	
18. Other (specify): ______________	48	

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SECTION C INSTRUCTIONS: INPATIENT NURSING UNIT CHARACTERISTICS AND PERSONNEL

PART 1

1. Report or estimate inpatient nursing unit characteristics (number of beds, and patient census), for the last 24 hour day.
2. Enter a zero (0) in the appropriate spaces when this hospital does not have a specified type of nursing unit.
3. EXCLUDE the emergency room, operating (survey) room, and recovery room from any information reported
4. Include data for inpatient nursing units in your entire hospital and all parts, components, institutions, etc., unless otherwise specified. Exclude any component or inpatient nursing unit having its own separate discharge procedures.

PART 2 - Assigning Personnel to Nursing Units:

A. Report employees in one of the following units ONLY if they work in one specific unit for at least 75% of their working time.

Unit 1 - Intensive care and/or coronary care unit
Unit 2 - General medical and/or surgical unit
Unit 3 - Extended care and/or self-care unit
Unit 4 - Other inpatient bed unit

B. Report ALL OTHER nursing unit personnel, who work in more than one unit of the same or of a different type, in the last category. Such personnel are assigned to units as needed (e.g., to meet shortages caused by regular staff who do not report to work or, because of an overload of patients not requiring a particular type of care).

DEFINITION OF NURSING UNITS

Unit 1 - Intensive care and/or coronary care units - A special unit in which patients are concentrated by reason of serious illness, with or without regard to diagnosis. Special lifesaving techniques and equipment are immediately available and patients are under continuous observation by nursing staff. Include burn care and respiratory acute care units.

Unit 2 - General medical/surgical units - Inpatient adult bed units established primarily for nursing care of patients in an acute phase of illness.

Unit 3 - Extended care and/or self-care units - Inpatient adult bed units established solely for patients not in an acute phase of illness but who require primary convalescent or restorative care or, who are ambulatory but must remain hospitalized. Include long-term psychiatric units-Alternate unit titles: Ambulatory care, domiciliary, long-term care, nursing home care.

Unit 4 - Other inpatient bed units - Units providing inpatient bed care but not classified in categories above. Examples of units to include:

Alcoholism	Neonatal	Rehabilitation	Maternity
Chronic Disease	Obstetric	Renodialysis	Psychiatric (short-term)
Drug Addiction	Pediatric	Tuberculosis	

DEFINITIONS OF CERTAIN TERMS USED TO DESCRIBE INPATIENT NURSING UNIT PERSONNEL

1. Clinical specialist (RN) - Expert nurse clinician with particular knowledge, skill and competence in specialized area of nursing who serves as consultant to nurses in specific practice areas independent of administrative nurse direction, and/or provides direct specialized care to patients.
2. Head nurse or assistant head nurse (RN) - Directs and supervises nursing service for only one inpatient care unit. Include RNs whose duties are regularly those of a charge nurse.
3. Supervisor or assistant supervisor (RN) - Directs and supervises nursing service for two or more inpatient care units of the same type or of different types.
4. Staff nurse (RN) - Responsible for the direct and indirect total nursing care of patients. Include general duty and team leaders.
5. Other RN personnel - Other RNs who are assigned patient care duties, not identified elsewhere in the unit (Unit 1, 2, 3, or 4). Please specify job titles of such RNs.
6. Supervisor and/or assistant supervisor (Non-RN) - Personnel who are not RNs but direct and supervise nursing personnel for two or more inpatient care units of the same type or of different types.
7. Other nursing unit personnel - Personnel not included elsewhere who regularly work in an inpatient nursing unit (e.g., may include nursing or medical technicians, coronary care technicians and other personnel regular working in an inpatient nursing unit). Please specify the occupations of such personnel.
8. Float personnel - Personnel who are not assigned to one specific nursing unit, but are assigned to units of the same or different types as needed.

For definitions of RN (07.01), LPN or LVN (07.04), Ward Clerk (07.05) and Nursing Aide, Orderly, or Attendant (07.08), see Glossary of Occupational Definitions.

SECTION C. INPATIENT NURSING UNIT CHARACTERISTICS AND PERSONNEL

PART 1. INPATIENT NURSING UNIT CHARACTERISTICS

For each of the different types of units, record the total number of units, number of beds, patient census last 24 hour day, and average length of stay in the units. *(If none, enter "0").*

TYPE OF INPATIENT NURSING UNIT	Number of Units	Number of Beds	Patient Census	Average length of stay		
				30 days or more (Mark X)	Less than 30 days	
					Days	Hours (if less than a day)
Unit 1. Intensive care and/or coronary care unit	60-61	62-65	66-69	70	71-72	73-74
Unit 2. General medical/surgical unit	75-76	77-80	81-84	85	86-87	88-89
Unit 3. Extended care or self-care unit	90-91	92-95	96-99	100	101-102	103-104
Unit 4. Other inpatient bed units *(Specify below)*	105-106	107-110	111-114	115	116-117	118-119

CARD 12

Please list the functional categories *(types)* of the nursing units you included in Unit 4:

PART 2. NUMBER OF INPATIENT NURSING UNIT EMPLOYEES ON PAYROLL

Count each employee only once according to the FUNCTION performed for the largest amount of time. EXCLUDE all personnel whose PRIMARY FUNCTION is other than PATIENT CARE *(e.g., research, administration, training, etc.)*

OCCUPATIONAL CATEGORY	NUMBER OF EMPLOYEES ON HOSPITAL'S PAYROLL ASSIGNED TO:									
	UNIT 1 ONLY		UNIT 2 ONLY		UNIT 3 ONLY		UNIT 4 ONLY		MULTIPLE UNITS	
	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time	Full-time	Part-time
Registered Nurses, Total										
Clinical Specialists										
Head or Assistant Head Nurse										
Staff Nurse										
Supervisor or Asst. Supervisor										
Other RN's										
Licensed Practical or Vocational nurse										
Nurse's Aides, Orderlies, and Attendants										
Ward Clerks										
Non-RN Supervisor or Asst. Supervisor										
Other Nursing Unit Personnel										

SECTION D - CHANGES IN HOSPITAL SIZE

1. What is the total number of beds in this hospital at the present time *(i.e., beds that are set-up and staffed for use)?* __________
84-88

2. Has the total number of employees on the payroll of this hospital changed more than ±10 percent since October 1976?

1 ☐ Yes 2 ☐ No

89

→ If yes, approximately how many employees were added (or dropped)?

a) Number of employees added __________, or
90-93

b) Number of employees dropped __________
94-97

CARD 11

AUTHORIZATION TO RELEASE DATA PROVIDED ON THIS QUESTIONNAIRE

For each of the organizations listed below, please check either the "yes" or "no" box to authorize release of data.

Should the data be released to	Yes	No
(1) The American Hospital Association	☐	☐
(2) Your State Hospital Association	☐	☐
(3) The State Cooperative Health Statistics System Agency	☐	☐
(4) The State Health Planning Agency and/or Health Systems Agency designated under Public Law 93-641	☐	☐

What was the approximate time required to complete this questionnaire? __________

If questions should arise concerning responses to this questionnaire, whom should we contact?

NAME: __________
TITLE: __________
TELEPHONE: __________

Please return this questionnaire in the postage-paid envelope enclosed. Thank you for your cooperation.

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Rev. 4/77

Trienniel Bureau of Labor Statistics
Occupational Employment Surveys

BLS-MA 2877. 801-1

Form Approve
O.M.B. No. 44 02

State Agencies, the Bureau of Labor Statistics, and the Manpower Administration cooperating in this statistical program will hold all information furnished by the respondent in strict confidence.

in Cooperation with
The Bureau of Labor Statistics and The Manpower Administration
U.S. DEPARTMENT OF LABOR

Office Use Only	
Status	Aux.

REPORT ON OCCUPATIONAL EMPLOYMENT FOR PHYSICIANS', DENTISTS', SURGEONS' OSTEOPATHS', AND CHIROPRACTORS' OFFICES

INDUSTRY DESCRIPTION: If this Industry Description is inappropriate for your establishment, i.e., if it does not generally include your unit's major products or service, please describe the correct one below. (e.g., Manufacturing–Women's Shoes, Research Lab–Radio and TV Receivers, etc.)

____

REPORTING UNIT: Complete this report for your company operation (reporting unit) identified on the mailing label below. Its physical location has been printed in the lower left portion of the label and our estimate of its total employment is in the lower right corner of the label. (Multi-unit employers may receive questionnaire forms for more than one reporting unit.)

REPORTING PERIOD: Report information for a payroll period that includes June 12, 1975. If, because of unusual operational problems (e.g., work stoppages, temporary shutdowns), this period is not typical, please report for the pay period in which operations most closely approximate the normal and indicate the period selected: ________________.

PART I PLEASE COMPLETE THESE FIVE ITEMS:

A. UNIT TOTAL EMPLOYMENT .... (999999) ☐

Enter the total employment, as defined in the instructions, of the reporting unit shown on the address label. This figure should equal the sum of all employment reported by occupation on the pages which follow (transcribe from the last page of this report).

B. TYPE OF OWNERSHIP *(Please check one of the following)*

(1) ☐ Corporation (2) ☐ Partnership (3) ☐ Sole Proprietorship

(4) ☐ Other *(explain)* ________________

C. STATUS OF ACTIVITY If the Reporting Unit did not operate under your management during the reporting period, please check the appropriate block below.

(1) ☐ This unit has been sold or merged. New name and address is: ________________

(2) ☐ This unit is out of business. (3) ☐ Other *(Describe)* ________________

D. AUXILIARY UNIT STATUS If the Reporting Unit is *primarily* engaged in performing services for other units of your company, please check the one block below that best describes the service performed:

(1) ☐ Central administrative office (2) ☐ Research, development, or testing (3) ☐ Storage *(Warehouse)* (4) ☐ Other *(Specify, e.g., powerplant)* ________________

E. If questions arise concerning your report, whom should we contact?

Name	Title	City & State	Telephone

KEEP THIS COPY

FOR YOUR FILES

Please change if incorrect

REPORTING INSTRUCTIONS

Please review the following instructions and occupational list. If you have any questions regarding the reporting unit requested or if the occupational list seems totally incompatible with your work force, please telephone the number indicated in the attached letter.

1. Enter Unit Total Employment on page one (Part I, Item A) and employment by occupation on the following pages. Unit Total Employment and the sum of the employees reported should be the same.

   UNIT TOTAL EMPLOYMENT.

   Includes: Full or part-time paid workers. Workers on *paid* vacations or other types of leave. Workers on *unpaid* short-term absences (i.e., illness, bad weather, temporary lay-off, jury duty). Salaried officers, executives and staff of incorporated firms. Employees temporarily assigned to other units. Employees for whom this unit is their permanent (home) duty station, regardless of whether this unit prepares their paycheck.

   Excludes: Proprietors, owners and partners of unincorporated firms. Unpaid family workers. Workers on extended leave (i.e., pensioners and members of the armed forces).

2. Parts II and III. Report the appropriate employees in the listed occupations in Part II. Then complete Part III by writing a descriptive job title, the main duties, and the corresponding number of employees for all occupations *not* reported in Part II.

   Report an employee only once. If job duties cover more than one occupation listed, show the employee in the occupation which you believe requires the *highest level of skill.*

   Report employees in the occupation in which *they* are working, not in an occupation for which they may have been trained, if that is different. For example, an employee trained as an Engineer but working as a Draftsman, should be reported as a Draftsman.

   Report working foremen (those spending 20% or more of their time at work similar to that performed by workers under their supervision) in the occupations which are most closely related to their work duties.

   Report part-time workers, learners, and apprentices in the occupation in which they ordinarily perform their work.

   Report in Part III those skilled trade helpers and semiskilled worker helpers not separately listed in Part II.

   Report Apprentices in the occupation's Total column (3) as well as the Apprentice column (4). If you have no apprentices, ignore this column. *Apprentices are defined as follows:* Workers who learn, according to a written or oral contractual agreement, a recognized skilled craft or trade requiring more than two (2) years of on-the-job training through job experience supplemented by related instructions, prior to the time that they may be considered qualified workers. *Helpers and learners should be excluded from column (4).*

3. Add all column (3) entries and record the grand total of all employees at the end of the report. This figure should also be shown as Unit Total Employment on page 1 (Part I, Item A).

4. Transcribe your employment, by occupation, onto the enclosed duplicate report to maintain a record for your files; then mail the labeled report in the enclosed postage-paid envelope.

EMPLOYMENT BY OCCUPATION

Column (3)–Enter the TOTAL number of workers you employ in each of the listed occupations.

Column (4)–Enter the number of APPRENTICES already reported in column (3). See Definition page 2.

PART II Occupations NOTE: The following is an abbreviated list of occupations in your industry. If you have different or additional occupations, please list them in Part III. (1)	Occupational Code (2)	Number of Employees Total (3)	Apprentices (4)
MANAGERS AND OFFICERS *(INCLUDE* CORPORATE OFFICERS; DISTRICT MANAGERS; FOOD AND DRUG INSPECTOR; INSERVICE DIRECTOR; SANITARIAN; HEALTH ADMINISTRATOR; DIRECTOR OF NURSES; BUSINESS DIRECTOR; LABORATORY DIRECTOR; OFFICE MANAGER; SALES MANAGER, ETC.; *EXCLUDE* OWNERS AND PARTNERS OF UNINCORPORATED FIRMS): Include persons concerned with policy making, planning, organizing, staffing, directing, and/or controlling activities that are common to many types of organizations, usually through subordinate supervisors who directly supervise the activities of the company or establishment workforce and/or professional or technical management support personnel. Also include persons responsible for the operation of an enterprise or establishment (usually small-scale) in which they may engage, in part, in the same activities as the workers they supervise, but who also directly organize, control, and coordinate activities, do the planning, and who may be responsible for such matters as financing. (Include *only* Managers and Officers who are exempt from the minimum wage and overtime provisions of the Fair Labor Standards Act.)	10000		
PHYSICIAN AND OR SURGEON (ANESTHESIOLOGIST; GENERAL PRACTITIONER; GYNECOLOGIST; OBSTETRICIAN; OPHTHALMOLOGIST; PATHOLOGIST; PEDIATRICIAN; PSYCHIATRIST; RADIOLOGIST; OSTEOPATH; ETC.; *EXCLUDE* OWNERS AND PARTNERS OF UNINCORPORATED FIRMS): A doctor of medicine who diagnoses and treats mental or physical disorders. May specialize in surgery, obstetrics, psychiatry, etc.	25469		
PHYSICIAN'S ASSISTANT (PHYSICIAN'S ASSISTANT, PRIMARY CARE; PHYSICIAN'S ASSISTANT, SPECIALIST; ETC.): Performs physician delegated functions in the area of primary care, including family medicine, internal medicine, pediatrics, obstetrics, and emergency medicine, or functions in specific areas of patient care, such as urology, surgery, pathology, and orthopedics.	34016		
MEDICAL ASSISTANT: Performs various duties under the direction of physician in examination and treatment of patients. Prepares treatment room, inventory of supplies, instruments, and patient for attention of physician. Hands instruments and materials to physician as directed.	44081		
DENTIST (DENTAL SURGEON; ORTHODONTIST; PERIODONTIST; ORAL PATHOLOGIST; ORAL SURGEON; ETC.): Diagnoses, treats, or corrects diseases, injuries, malformations, or facial deviations from the normal position of teeth or gums, and related oral or dental-facial structures.	25433		
DENTAL HYGIENIST (ORAL HYGIENIST; PROPHYLACTICIAN; ETC.): Performs dental prophylactic treatments and instructs groups and individuals in care of teeth and mouth.	35001		
DENTAL ASSISTANT: Assists dentist at chair, sets up patient and equipment; keeps records and related duties as required.	34003		
CHIROPRACTOR (CHIROPRACTIC; ETC.): Adjusts spinal column and other articulations of body to prevent disease and correct abnormalities of human body believed to be caused by interference with nervous system.	25419		
NURSE, PROFESSIONAL (NURSE, REGISTERED; NURSE, CLINIC; ETC.; *EXCLUDE* PRACTICAL NURSE AND NURSE SUPERVISOR): Administers nursing care to ill or injured. Include administrative and instructing nurses, and public health, industrial, private duty and surgical nurses. Licensing or registration is required.	25457		
LICENSED PRACTICAL NURSE (*EXCLUDE* PROFESSIONAL NURSE): Cares for ill, injured, convalescent, and handicapped persons in hospitals, clinics, private homes, sanitariums and similar institutions.	34013		
PHYSICAL THERAPIST (PHYSIOTHERAPIST; ETC.). Applies techniques and treatments which help relieve pain, increase the patient's strength, decrease or prevent deformity and crippling.	25468		
CORRECTIVE THERAPIST: Applies techniques and treatments designed to prevent muscular deterioration resulting from long convalescence or inactivity due to chronic illness.	25541		
OCCUPATIONAL THERAPIST: Plans, organizes, and participates in medically oriented occupational program in hospital or similar institution to rehabilitate patients who are physically or mentally ill.	25458		

EMPLOYMENT BY OCCUPATION

Occupations (1)	Occupational Code (2)	Number of Employees	
		Total (3)	Apprentices (4)
INHALATION THERAPIST (OXYGEN-THERAPY EQUIPMENT TECHNICIAN; PULMONARY THERAPIST; RESPIRATORY THERAPIST; ETC.): Sets up and operates various types of oxygen equipment, such as iron lungs, oxygen tents, resuscitators, and incubators to administer oxygen and other gases to patients.	25542		
MEDICAL LABORATORY TECHNOLOGIST: Performs complex or specialized bacteriological, biological, and chemical tests under the supervision of a pathologist, physician, or qualified scientist for use in the diagnosis and evaluation of treatment of disease.	35002		
MEDICAL LABORATORY ASSISTANT (MEDICAL TECHNICIAN; ETC.): Performs routine tests in medical laboratory for use in treatment and diagnosis of diseases.	35010		
DENTAL LABORATORY TECHNICIAN (CERAMIC TECHNICIAN; DENTURE TECHNICIAN; MAXILLOFACIAL TECHNICIAN; ORTHODONTIC TECHNICIAN; TECHNICIAN, PARTIAL CAST; TECHNICIAN, CROWN/BRIDGE; ETC.): Constructs and repairs dental appliances, according to Dentist's or Orthodontist's prescription.	55062		
X-RAY TECHNICIAN (RADIOLOGIC TECHNICIAN; RADIOLOGIC TECHNOLOGIST; ETC.): Maintains and safely uses equipment and supplies necessary to demonstrate portions of the human body on X-ray film or fluoroscopic screen for diagnostic purposes.	34036		
ELECTROCARDIOGRAPH TECHNICIAN (EKG TECHNICIAN; ETC.): Records electromotive variations in action of heart muscle, using electrocardiograph machine, to provide data for diagnoses of heart ailments.	35011		
OPTICIAN, DISPENSING AND/OR OPTICAL MECHANIC, OPHTHALMIC GOODS (OPTICIAN; ETC.): Performs one or more of the following duties: Sets up and operates machines to grind and polish eyeglass lenses to prescription specifications, and assembles lenses into frames; fabricates lenses to prescription specifications, and may assist customer in selection of frames and fits frame to customer; may fit contact lenses to prescription specifications.	55069		
CASHIER (CASH REGISTER OPERATOR; CHECK-OUT CLERK; CREDIT CLERK; ETC.): Receives and disburses money in establishments other than banks. Usually involves use of adding machines, cash registers, and change makers. Include Cashier Checkers.	61314		
INSURANCE CLERK, MEDICAL: Verifies hospitalization insurance coverage and computes benefits for patients in hospitals, clinics and other medical facilities.	61348		
SWITCHBOARD OPERATOR (PBX OPERATOR; TELEPHONE SWITCHBOARD OPERATOR; ETC.): Operates cord or cordless switchboard to relay incoming, outgoing, and interoffice calls. May supply information to callers and record messages.	61376		
RECEPTIONIST (APPOINTMENT CLERK; INFORMATION CLERK; REGISTER CLERK; HOSPITAL-ADMITTING CLERK; ETC.): Receives visitors coming into the establishment. Determines visitor's purpose and directs him to the proper person or department. May perform additional clerical duties such as typing.	61361		
SWITCHBOARD OPERATOR RECEPTIONIST: In addition to performing duties of switchboard operator, acts as receptionist and may also type or perform routine clerical work as part of regular duties. The typing or clerical work may take part of this worker's time while at switchboard.	61377		
SECRETARY (MEDICAL SECRETARY; ETC.): Schedules appointments, gives information to caller, takes and transcribes dictation, and otherwise relieves officials of clerical work and minor administrative and business detail.	61365		
TYPIST (*INCLUDE* CLERK-TYPIST): Types letters, reports, stencils, forms, addresses, or other straight-copy material from rough draft or corrected copy. May perform other clerical duties as assigned.	61392		
FILE CLERK: Files correspondence, cards, invoices, receipts, and other records in alphabetical or numerical order, or according to the filing system used. Locates and removes material from file when requested. May be required to classify and file new material.	61330		

EMPLOYMENT BY OCCUPATION

Occupations (1)	Occupational Code (2)	Numbers of Employees	
		Total (3)	Apprentices (4)
BOOKKEEPER, HAND: Keeps record of financial transactions of establishment or keeps one section or set of financial records.	61307		
BOOKKEEPING AND BILLING MACHINE OPERATORS: Operates special billing machines, generally a combination typing and adding machine, to prepare statements, bills, and invoices, or operates bookkeeping machines to copy and post data, make computations, and/or compile records of transactions.	61103		
MAID: Cleans rooms and halls in such establishments as hotels, motels, restaurants, clubs, depots, beauty parlors and dormitories performing duties such as sweeping and mopping floors, vacuuming, dusting, washing walls, sorting linens, etc.	41003		
JANITORS, PORTERS, AND CLEANERS (*EXCLUDE MAID*): Keep building in clean and orderly condition, may have additional duties and responsibilities such as tending furnace and boiler, performing routine maintenance activities, notifying management of need for repairs and additions, and cleaning snow or debris from sidewalks.	41900		

If you have occupations in addition to those listed above, please report them in Part III which follows.

EMPLOYMENT BY OCCUPATION

For Office Use Only	PART III List by Occupation (1) *(Write in a sub title and a short description of typical duties for each job not included in Part II.)*	Total Number of Employees (3)	Apprentices (4)
	TOTAL OF COLUMN (3) ENTRIES (PARTS II AND III):		

If this total does not represent your UNIT TOTAL EMPLOYMENT as defined in the Instructions, re-check this report and make the necessary corrections. Transfer the correct total to item A on page 1 of this report.

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BLS-MA-2877 Rev. 3

Form App
O.M.B. No. 44-S75602

State Agencies, the Bureau of Labor Statistics, and the Manpower Administration cooperating in this statistical program will hold all information furnished by the respondent in strict confidence.

In Cooperation with
The Bureau of Labor Statistics and The Manpower Administration
U.S. DEPARTMENT OF LABOR

Office Use Only	
Status	Anc.

REPORT ON OCCUPATIONAL EMPLOYMENT FOR MEDICAL AND DENTAL LABORATORIES

INDUSTRY DESCRIPTION If this Industry Description is inappropriate for your establishment, i.e., if it does not generally include your unit's major products or service, please describe the correct one below. (e.g., Manufacturing Women's Shoes; Research Lab–Radio and TV Receivers, etc.)

801S07
MEDICAL LABORATORIES PROVIDING PROFESSIONAL ANALYSIS, DIAGNOSIS, OR TREATMENT SERVICES TO THE MEDICAL PROFESSION INCLUDING DENTAL LABORATORIES MAKING DENTURES AND ARTIFICIAL TEETH TO ORDER FOR THE DENTAL PROFESSION.

REPORTING UNIT: Complete this report for your company operation (reporting unit) identified on the mailing label below. Its physical location has been printed in the lower left portion of the label and our estimate of its total employment is in the lower right corner of the label. (Multi-unit employers may receive questionnaire forms for more than one reporting unit.)

REPORTING PERIOD: Report information for a payroll period that includes June 12, 1975. If, because of unusual operational problems (e.g., work stoppages, temporary shutdowns), this period is not typical, please report for the pay period in which operations most closely approximate the normal and indicate the period selected ________.

PART I PLEASE COMPLETE THESE FIVE ITEMS:

KEEP THIS COPY

FOR YOUR FILES

Please change if incorrect

A. UNIT TOTAL EMPLOYMENT . . . . (999999) ☐
Enter the total employment, as defined in the instructions, of the reporting unit shown on the address label. This figure should equal the sum of all employment reported by occupation on the pages which follow (transcribe from the last page of this report).

B. TYPE OF OWNERSHIP *(Please check one of the following)*
(1) ☐ Corporation (2) ☐ Partnership (3) ☐ Sole Proprietorship
(4) ☐ Other *(explain)* ________

C. STATUS OF ACTIVITY If the Reporting Unit did not operate under your management during the reporting period, please check the appropriate block below.
(1) ☐ This unit has been sold or merged. New name and address is ________
(2) ☐ This unit is out of business (3) ☐ Other *(Describe)* ________

D. AUXILIARY UNIT STATUS If the Reporting Unit is *primarily* engaged in performing services for other units of your company, please check the one block below that best describes the service performed:
(1) ☐ Central administrative office (2) ☐ Research, development, or testing (3) ☐ *Storage (Warehouse)* (4) ☐ Other *(Specify, e.g., powerplant)* ________

E. If questions arise concerning your report, whom should we contact?

Name	Title	Area Code	Telephone

REPORTING INSTRUCTIONS

Please review the following instructions and occupational list. If you have any questions regarding the reporting unit requested or if the occupational list seems totally incompatible with your work force, please telephone the number indicated in the attached letter.

1. Enter Unit Total Employment on page one (Part I, Item A) and employment by occupation on the following pages. Unit Total Employment and the sum of the employees reported should be the same.

UNIT TOTAL EMPLOYMENT:

Includes: Full or part-time paid workers. Workers on *paid* vacations or other types of leave. Workers on *unpaid* short-term absences (i.e., illness, bad weather, temporary layoff, jury duty). Salaried officers, executives and staff of incorporated firms. Employees temporarily assigned to other units. Employees for whom this unit is their permanent (home) duty station, regardless of whether this unit prepares their paycheck.

Excludes: Proprietors, owners and partners of unincorporated firms. Unpaid family workers. Workers on extended leave (i.e., pensioners and members of the armed forces).

2. Parts II and III. Report the appropriate employees in the listed occupations in Part II. Then complete Part III by writing a descriptive job title, the main duties, and the corresponding number of employees for all occupations not reported in Part II.

Report an employee only once. If job duties cover more than one occupation listed, show the employee in the occupation which you believe requires the *highest level of skill*.

Report employees in the occupation in which they are working, not in an occupation for which they may have been trained, if that is different. For example, an employee trained as an Engineer but working as a Draftsman, should be reported as a Draftsman.

Report working foremen (those spending 20% or more of their time at work similar to that performed by workers under their supervision) in the occupations which are most closely related to their work duties.

Report part-time workers, learners, and apprentices in the occupation in which they ordinarily perform their work.

Report in Part III those skilled trade helpers and semiskilled worker helpers not separately listed in Part II.

Report Apprentices in the occupation's Total column (3) as well as the Apprentice column (4). If you have no apprentices, ignore this column. *Apprentices are defined as follows:* Workers who learn, according to a written or oral contractual agreement, a recognized skilled craft or trade requiring more than two (2) years of on-the-job training through job experience supplemented by related instructions, prior to the time that they may be considered qualified workers. *Helpers and learners should be excluded from column (4).*

3. Add all column (3) entries and record the grand total of all employees at the end of the report. This figure should also be shown as Unit Total Employment on page 1 (Part I, Item A).

4. Transcribe your employment, by occupation, onto the enclosed duplicate report to maintain a record for your files; then mail the labeled report in the enclosed postage-paid envelope.

EMPLOYMENT BY OCCUPATION

Column (3)–Enter the TOTAL number of workers you employ in each of the listed occupations.

Column (4)–Enter the number of APPRENTICES already reported in column (3). See Definition page 2.

PART II Occupations NOTE: The following is an abbreviated list of occupations in your industry. If you have different or additional occupations, please list them in Part III. (1)	Occupational Code (2)	Number of Employees Total (3)	 Apprentices (4)
MANAGERS AND OFFICERS (*INCLUDE* CORPORATE OFFICERS; DISTRICT MANAGERS; FOOD AND DRUG INSPECTOR; IN SERVICE DIRECTOR; SANITARIAN; HEALTH ADMINISTRATOR; DIRECTOR OF NURSES; BUSINESS DIRECTOR; LABORATORY DIRECTOR; OFFICE MANAGER; SALES MANAGER; ETC.; *EXCLUDE* OWNERS AND PARTNERS OF UNINCORPORATED FIRMS): Include persons concerned with policy making, planning, organizing, staffing, directing, and/or controlling activities that are common to many types of organizations, usually through subordinate supervisors who directly supervise the activities of the company or establishment work force and/or professional or technical management support personnel. Also include persons responsible for the operation of an enterprise or establishment (usually small scale) in which they may engage, in part, in the same activities as the workers they supervise, but who also directly organize, control, and coordinate activities, do the planning, and who may be responsible for such matters as financing. (Include only Managers and Officers who are exempt from the minimum wage and overtime provisions of the Fair Labor Standards Act.)	10000		
PHYSICIAN AND/OR SURGEON (ANESTHESIOLOGIST; GENERAL PRACTITIONER; GYNECOLOGIST; OBSTETRICIAN; OPTHALMOLOGIST; PATHOLOGIST; PEDIATRICIAN; PSYCHIATRIST; RADIOLOGIST; OSTEOPATH; ETC.; *EXCLUDE* OWNERS AND PARTNERS OF UNINCORPORATED FIRMS): A doctor of medicine who diagnoses and treats mental or physical disorders. May specialize in surgery, obstetrics, psychiatry, etc.	25469		
DENTIST (DENTAL SURGEON; ORTHODONTIST; PERIODONTIST; ORAL PATHOLOGIST; ORAL SURGEON; ETC.): Diagnoses, treats, or corrects diseases, injuries, malformations, and deviations from the normal position of teeth or gums, and related oral or dental-facial structures.	25433		
ACCOUNTANTS AND AUDITORS (ACCOUNT AUDITOR; COST ACCOUNTANT; FIELD ACCOUNTANT; INDUSTRIAL ACCOUNTANT; PAYROLL ACCOUNTANT; ETC.): Examines, analyzes, and interprets accounting records for the purpose of giving advice or preparing statements and installing or advising on systems of recording costs or other financial and budgetary data.	25401		
PERSONNEL AND LABOR RELATIONS SPECIALISTS (UTILIZATION OFFICER; JOB ANALYST; POSITION CLASSIFIER; ETC.): *Personnel Specialist*: Conducts programs of recruitment, selection, training, promotion, welfare, safety, compensation, recreation and separation of employees. Include such occupations as Utilization Officer, Job Analyst, Position Classifier, etc. *Exclude* occupations in personnel research and in administration of testing and counseling programs, for which a background in psychology is required. *Labor Relations Specialist*: Serves as specialist on labor management relations, representing either management or labor union. Studies and interprets collective bargaining agreements, and current labor market conditions to assist in establishing policies and operating procedures. Reviews contract administration to insure that management and labor organizations adhere to contract specifications.	25465		
MEDICAL LABORATORY TECHNOLOGIST: Performs complex or specialized bacteriological, biological, and chemical tests under the supervision of a pathologist, physician, or qualified scientist for use in the diagnosis and evaluation of treatment of disease.	35002		
MEDICAL LABORATORY ASSISTANT (MEDICAL TECHNICIAN; ETC.): Performs routine tests in medical laboratory for use in treatment and diagnosis of disease.	35010		
DENTAL LABORATORY TECHNICIAN (CERAMIC TECHNICIAN, DENTURE TECHNICIAN; MAXIO-FACIAL TECHNICIAN; ORTHODONIC TECHNICIAN; TECHNICIAN, PARTIAL CAST; TECHNICIAN, CROWN, BRIDGE; ETC.): Constructs and repairs dental appliances, according to dentist's or orthodontist's prescription.	55062		
BIOCHEMISTRY TECHNOLOGIST: Performs qualitative and quantitative chemical analyses of body fluids and exudates to provide information used in diagnosing and treating diseases.	35003		
MICROBIOLOGY TECHNOLOGIST: Cultivates, isolates, and assists in identifying bacteria and other micro-organisms and performs various tests for evidence of disease or parasites.	35004		
CYTOTECHNOLOGIST: Stains, mounts, and studies cells of human body to determine pathological condition.	35005		

EMPLOYMENT BY OCCUPATION

Occupations (1)	Occupational Code (2)	Number of Employees	
		Total (3)	Apprentices (4)
HISTOLOGIC TECHNOLOGIST (TISSUE TECHNOLOGIST; ETC.): Cuts, stains, mounts and studies specimens of animal or human tissues to provide data on functioning of tissues and organs, and causes or progress of disease.	35006		
X-RAY TECHNICIAN (RADIOLOGIC TECHNICIAN; RADIOLOGIC TECHNOLOGIST; ETC.): Maintains and safely uses equipment and supplies necessary to demonstrate portions of the human body on X-ray film or fluoroscopic screen for diagnostic purposes.	34036		
NUCLEAR MEDICINE TECHNOLOGIST: Administers and measures radioactive nuclides in diagnostic and therapeutic applications utilizing a variety of techniques and equipment under the supervision of a physician.	35007		
RADIATION THERAPY TECHNOLOGIST: Administers X-ray and electron beam equipment in order to treat disease in patients, and assists in preparing and handling radioactive materials for therapy purposes.	35008		
OPTICIAN, DISPENSING AND OR OPTICAL MECHANIC, OPHTHALMIC GOODS (OPTICIAN, ETC.): Performs one or more of the following duties. Sets up and operates machines to grind and polish eyeglass lenses to prescription specifications, and assembles lenses into frames; fabricates lenses to prescription specifications, and may assist customer in selection of frames and fits frame to customer; may fit contact lenses to prescription specifications.	55069		
RADIATION MONITOR (HEALTH PHYSICS TECHNICIAN; PERSONNEL MONITOR; RADIATION PROTECTION MAN, ETC.): Monitors personnel, facilities, and work environment to detect radioactive contamination, using radiation detectors and other instruments.	34026		
CHEMICAL ENGINEER: Designs chemical plant equipment and devises processes for manufacturing chemicals and products such as gasoline, synthetic rubber, plastics, detergents, cement, and paper and pulp, applying principles and technology of chemistry, physics, and engineering.	21003		
BIOLOGICAL SCIENTIST (HISTOPATHOLOGIST; MEDICAL BACTERIOLOGIST; CYTOLOGIST; ETC.): Include scientists concerned with research into problems dealing with life processes. Include pathologists, microbiologists, pharmacologists, bacteriologists, toxicologists, and zoologists.	22302		
CHEMIST (CHEMICAL ANALYST; LABORATORY CHEMIST; ORGANIC CHEMIST; PHYSICAL BIOCHEMIST; ETC.): Conducts chemical tests, qualitative and quantitative chemical analyses or chemical experiments in laboratories for quality or process control or to develop new products or new knowledge.	22201		
CLERICAL SUPERVISOR (BILLING SUPERVISOR; STOCK CLERK SUPERVISOR, ETC.; *EXCLUDE OFFICE MANAGER*): Supervises and coordinates activities of workers engaged chiefly in one type of clerical function such as typing, filing, bookkeeping, tabulating data, etc. May assume responsibility for completion of work assignments by clerical force being supervised and for the accuracy of completed assignments. This classification does not include working supervisors (those spending 20 percent or more of their time at tasks similar to those of employees under their supervision).	61396		
SWITCHBOARD OPERATOR (PBX OPERATOR, TELEPHONE SWITCHBOARD OPERATOR, ETC.): Operates cord or cordless switchboard to relay incoming, outgoing, and interoffice calls. May supply information to callers and record messages.	61376		
RECEPTIONIST (APPOINTMENT CLERK; INFORMATION CLERK; REGISTER CLERK; HOSPITAL ADMITTING CLERK; ETC.): Receives visitors coming into the establishment, determines visitor's purpose and directs him to the proper person or department. May perform additional clerical duties such as typing.	61361		
SWITCHBOARD OPERATOR-RECEPTIONIST: In addition to performing duties of switchboard operator, acts as receptionist and may also type or perform routine clerical work as part of regular duties. The typing or clerical work may take part of the worker's time while at switchboard.	61377		
SECRETARY (MEDICAL SECRETARY; ETC.): Schedules appointments, gives information to callers, takes and transcribes dictation, and otherwise relieves officials of clerical work and minor administrative and business detail.	61368		
STENOGRAPHER (MEDICAL STENOGRAPHER, ETC.): Takes dictation of correspondence, reports, and other matters, and transcribes dictated material. Performs variety of clerical duties except when working in stenographic pool. May transcribe material from sound recording.	61200		

EMPLOYMENT BY OCCUPATION

Occupations (1)	Occupational Code (2)	Number of Employees Total (3)	Number of Employees Apprentices (4)
TYPIST (*INCLUDE* CLERK TYPIST): Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy. May perform other clerical duties as assigned.	61392		
FILE CLERK (CARD FILER, DOCUMENT CLERK, ETC.): Files correspondence, cards, invoices, receipts, and other records in alphabetical or numerical order, or according to the filing system used. Locates and removes material from file when requested. May be required to classify and file new material.	61330		
BOOKKEEPER, HAND: Keeps record of financial transactions of establishment or keeps one section or set of financial records.	61307		
GENERAL CLERK (WARD CLERK, ETC.): Workers should be classified as General Clerks only if their duties are too varied and diverse to be classified in any specific office clerical occupation. Clerical duties may be assigned in accordance with the office procedures of individual establishments, and may include a combination of bookkeeping, typing, stenography, office machine operation, etc.	61333		
DELIVERYMEN AND ROUTEMEN (*INCLUDE* DRIVER AND ROUTE SALESMEN): Drives truck or other vehicle to deliver, sell, pickup and display merchandise and products. Operates within a specified locality or over an established local route. May solicit new business. May collect money for items delivered. May gather coins and refill vending machines.	55A87		
MAID: Cleans rooms and halls in such establishments as hotels, motels, restaurants, clubs, depots, beauty parlors and dormitories performing duties such as sweeping and mopping floors, vacuuming, dusting, washing walls, sorting linens, etc.	41003		
JANITORS, PORTERS, AND CLEANERS (*EXCLUDE* MAID): Keep building in clean and orderly condition; may have additional duties and responsibilities such as tending furnace and boiler, performing routine maintenance activities, notifying management of need for repairs and additions, and cleaning snow or debris from sidewalks.	41900		

If you have occupations in addition to those listed above, please report them in Part III which follows:

BLS MA-2877 801 3

Form Approved
O.M.B. No. 44-S75002

State Agencies, the Bureau of Labor Statistics, and the Manpower Administration cooperating in this statistical program will hold all information furnished by the respondent in strict confidence.

In Cooperation with
The Bureau of Labor Statistics and The Manpower Administration
U.S. DEPARTMENT OF LABOR

Office Use Only	
Status	Aux.

REPORT ON OCCUPATIONAL EMPLOYMENT FOR SANATORIA, CONVALESCENT HOMES & OTHER SELECTED HEALTH & ALLIED SERVICES

801509
INSTITUTIONS SUCH AS SANITORIA, CONVALESCENT HOMES, AND REST HOMES, IN WHICH MEDICAL OR SURGICAL SERVICES ARE NOT A MAIN FUNCTION. INCLUDE CLINICS AND DISPENSARIES NOT OPERATED BY HOSPITALS, BLOOD DONOR STATIONS, BIRTH CONTROL CLINICS, REGISTERED OPTOMETRISTS, PODIATRISTS, GROUP HEALTH ASSOCIATIONS, AND TRAINED AND PRACTICAL NURSES.

INDUSTRY DESCRIPTION: If this Industry Description is inappropriate for your establishment, i.e., if it does not generally include your unit's major products or service, please describe the correct one below: (e.g., Manufacturing-Women's Shoes, Research Lab Radio and TV Receivers, etc.)

____

REPORTING UNIT. Complete this report for your company operation (reporting unit) identified on the mailing Label below. Its physical location has been printed in the lower left portion of the label and our estimate of its total employment is in the lower right corner of the label. (Multi-unit employers may receive questionnaire forms for more than one reporting unit.)

REPORTING PERIOD. Report information for a payroll period that includes June 12, 1975. If, because of unusual operational problems (e.g., work stoppages, temporary shutdowns), this period is not typical, please report for the pay period in which operations most closely approximate the normal and indicate the period selected: ______________.

PART I PLEASE COMPLETE THESE FIVE ITEMS:

KEEP THIS COPY

FOR YOUR FILES

Please change if incorrect

A. UNIT TOTAL EMPLOYMENT .... (999999) ☐

Enter the total employment, as defined in the instructions, of the reporting unit shown on the address label. This figure should equal the sum of all employment reported by occupation on the pages which follow (transcribe from the last page of this report).

B. TYPE OF OWNERSHIP *(Please check one of the following)*

(1) ☐ Corporation (2) ☐ Partnership (3) ☐ Sole Proprietorship

(4) ☐ Other *(explain)* ______________

C. STATUS OF ACTIVITY If the Reporting Unit did not operate under your management during the reporting period, please check the appropriate block below

(1) ☐ This unit has been sold or merged. New name and address is ______________

(2) ☐ This unit is out of business. (3) ☐ Other *(Describe)* ______________

D. AUXILIARY UNIT STATUS If the Reporting Unit is *primarily* engaged in performing services for other units of your company, please check the one block below that best describes the service performed:

(1) ☐ Central administrative office (2) ☐ Research, development, or testing (3) ☐ Storage *(Warehouse)* (4) ☐ Other *(Specify, e.g., powerplant)* ______________

E. If questions arise concerning your report, whom should we contact?

Name	Title	City & State	Telephone

REPORTING INSTRUCTIONS

Please review the following instructions and occupational list. If you have any questions regarding the reporting unit requested or if the occupational list seems totally incompatible with your work force, please telephone the number indicated in the attached letter.

1. Enter Unit Total Employment on page one (Part I, Item A) and employment by occupation on the following pages. Unit Total Employment and the sum of the employees reported should be the same.

UNIT TOTAL EMPLOYMENT:

Includes: Full or part-time paid workers; Workers on *paid* vacations or other types of leave; Workers on *unpaid* short-term absences (i.e., illness, bad weather, temporary layoff, jury duty); Salaried officers, executives and staff of incorporated firms; Employees temporarily assigned to other units; Employees for whom this unit is their permanent (home) duty station, regardless of whether this unit prepares their paycheck.

Excludes: *Proprietors, owners and partners of unincorporated firms;* Unpaid family workers; Workers on extended leave (i.e., pensioners and members of the armed forces).

2. Parts II and III. Report the appropriate employees in the listed occupations in Part II. Then complete Part III by writing a descriptive job title, the main duties, and the corresponding number of employees for all occupations *not* reported in Part II.

Report an employee only once. If job duties cover more than one occupation listed, show the employee in the occupation which you believe requires the *highest level of skill.*

Report employees in the occupation in which they are working, not in an occupation for which they may have been trained, if that is different. For example, an employee trained as an Engineer but working as a Draftsman, should be reported as a Draftsman.

Report working foremen (those spending 20% or more of their time at work similar to that performed by workers under their supervision) in the occupations which are most closely related to their work duties.

Report part-time workers, learners, and apprentices in the occupation in which they ordinarily perform their work.

Report in Part III those skilled trade helpers and semiskilled worker helpers not separately listed in Part II.

Report Apprentices in the occupation's Total column (3) as well as the Apprentice column (4). If you have no apprentices, ignore this column. *Apprentices are defined as follows:* Workers who learn, according to a written or oral contractual agreement, a recognized skilled craft or trade requiring more than two (2) years of on-the-job training through job experience supplemented by related instructions, prior to the time that they may be considered qualified workers. *Helpers and learners should be excluded from column (4).*

3. Add all column (3) entries and record the grand total of all employees at the end of the report. This figure should also be shown as Unit Total Employment on page 1 (Part I, Item A).

4. Transcribe your employment, by occupation, onto the enclosed duplicate report to maintain a record for your files; then mail the labeled report in the enclosed postage-paid envelope.

EMPLOYMENT BY OCCUPATION

Column (3) –Enter the TOTAL number of workers you employ in each of the listed occupations.

Column (4) –Enter the number of APPRENTICES already reported in column (3). See Definition page 2.

PART II Occupations NOTE: The following is an abbreviated list of occupations in your industry. If you have different or additional occupations, please list them in Part III. (1)	Occupational Code (2)	Number of Employees Total (3)	Number of Employees Apprentices (4)
MANAGERS AND OFFICERS (*INCLUDE* CORPORATE OFFICERS; DISTRICT MANAGERS; FOOD AND DRUG INSPECTOR; IN SERVICE DIRECTOR; SANITARIAN; HEALTH ADMINISTRATOR; DIRECTOR OF NURSES; BUSINESS DIRECTOR; LABORATORY DIRECTOR; OFFICE MANAGER; SALES MANAGER; ETC.; *EXCLUDE* OWNERS AND PARTNERS OF UNINCORPORATED FIRMS): Include persons concerned with policy making, planning, organizing, staffing, directing, and/or controlling activities that are common to many types of organizations, usually through subordinate supervisors who directly supervise the activities of the company or establishment workforce and/or professional or technical management support personnel. Also include persons responsible for the operation of an enterprise or establishment (usually small scale) in which they may engage, in part, in the same activities as the workers they supervise, but who also directly organize, control, and coordinate activities, do the planning, and who may be responsible for such matters as financing. (Include only Managers and Officers who are exempt from the minimum wage and overtime provisions of the Fair Labor Standards Act.)	10000		
PHYSICIAN AND/OR SURGEON (ANESTHESIOLOGIST; GENERAL PRACTITIONER; GYNECOLOGIST; OBSTETRICIAN; OPTHALMOLOGIST; PATHOLOGIST; PEDIATRICIAN; PSYCHIATRIST; RADIOLOGIST; OSTEOPATH; ETC.; *EXCLUDE* OWNERS AND PARTNERS OF UNINCORPORATED FIRMS): A doctor of medicine who diagnoses and treats mental or physical disorders. May specialize in surgery, obstetrics, psychiatry, etc.	25469		
DENTIST (DENTAL SURGEON; ORTHODONTIST; PERIODONTIST; ORAL PATHOLOGIST; ORAL SURGEON; ETC.): Diagnoses, treats, or corrects diseases, injuries, malformations, or facial deviations from the normal position of teeth or gums, and related oral or dental facial structures.	25433		
NURSE, PROFESSIONAL (NURSE, REGISTERED; NURSE, CLINIC; ETC.; *EXCLUDE* PRACTICAL NURSE AND NURSE SUPERVISOR): Administers nursing care to ill or injured. Include administrative and instructing nurses, and public health, industrial, private duty and surgical nurses. Licensing or registration is required.	25457		
LICENSED PRACTICAL NURSE (*EXCLUDE* PROFESSIONAL NURSE): Cares for ill, injured, convalescent, and handicapped persons in hospitals, clinics, private homes, sanitariums and similar institutions.	34013		
NURSE AIDE AND/OR ORDERLY (HOSPITAL ATTENDANT; NURSING ATTENDANT; ETC.): Assists in care of patients, under direction of nursing and medical staff, in bathing, transporting, bedding, reading of patient's temperature and pulse, cleaning room and other facilities, and related duties as required.	44025		
SPEECH AND HEARING CLINICIANS AND PATHOLOGISTS (SPEECH PATHOLOGIST; AUDIOLOGIST; ETC.): Examine and provide remedial services for persons with speech and hearing disorders, and perform research related to speech and language problems.	25538		
PHYSICAL THERAPIST (PHYSIOTHERAPIST; ETC.): Applies techniques and treatments which help relieve pain, increase the patient's strength, decrease or prevent deformity and crippling.	25468		
CORRECTIVE THERAPIST: Applies techniques and treatments designed to prevent muscular deconditioning resulting from long convalescence or inactivity due to chronic illness.	25541		
MANUAL ARTS, MUSIC, AND/OR RECREATIONAL THERAPIST: Plans, organizes, and directs medically oriented manual arts, musical, or recreational programs in hospital or similar institution to rehabilitate patients who are physically or mentally ill.	25537		
OCCUPATIONAL THERAPIST: Plans, organizes, and participates in medically oriented occupational program in hospital or similar institution to rehabilitate patients who are physically or mentally ill.	25458		
OPTICIAN, DISPENSING, AND/OR OPTICAL MECHANIC, OPHTHALMIC GOODS (OPTICIAN; ETC.): Performs one or more of the following duties: Sets up and operates machines to grind and polish eyeglass lenses to prescription specifications, and assembles lenses into frames. Fabricates lenses to prescription specifications, and may assist customer in selection of frames and fits frame to contour of face; may fit contact lenses to prescription specifications.	55069		

EMPLOYMENT BY OCCUPATION

Occupations (1)	Occupational Code (2)	Number of Employees	
		Total (3)	Apprentices (4)
OUNTANTS AND AUDITORS (ACCOUNT AUDITOR; COST ACCOUNTANT; FIELD ACCOUNTANT; INDUSTRIAL ACCOUNTANT, PAYROLL OUNTANT, ETC.): Examines, analyzes, and interprets accounting records for the purpose of giving advice or preparing statements and installing or advising stems of recording costs or other financial and budgetary data	25401		
CHER, ADULT EDUCATION: Instructs out-of-school youths and adults in academic and nonacademic courses in schools or other organizations. Teaches ses, such as Americanization, fine arts, homemaking, public and business affairs, languages, and sciences.	25106		
TITIAN AND OR NUTRITIONIST (DIETARY CONSULTANT; DIETETIC INTERN; DIETITIAN, ADMINISTRATIVE; ETC.): Organizes, plans, and ducts food service or nutritional program to assist in promotion of health and control of disease. May administer activities of department providing quantity served. May plan, organize, and conduct projects in nutritional research.	25434		
AL WORKER (SOCIAL WORKER, MEDICAL; SOCIAL WORKER, PSYCHIATRIC; SOCIAL WORKER, CLINICAL; ETC.): Counsels and aids individuals families requiring assistance of social service agency.	25418		
CHOLOGIST (PSYCHOLOGIST, CLINICAL; PSYCHOLOGIST, INDUSTRIAL; PSYCHOLOGIST, EXPERIMENTAL; ETC.): Collects, interprets and applies ntific data relating to human behavior and mental processes. Activities are in either applied fields of psychology or in basic science fields and research. *Include* plications in personnel research and in administration of testing, and counseling programs. *Exclude* psychometrists.	23004		
RICAL SUPERVISOR (BILLING SUPERVISOR; STOCK CLERK SUPERVISOR; ETC.; EXCEPT OFFICE MANAGER): Supervises and coordinates ac s of workers engaged in one type of clerical function such as typing, filing, bookkeeping, tabulating data, etc. May assume responsibility for coor nation of work assignments of clerical force here, supervised and for the accuracy of completed assignments. Classify in this occupation [illegible] include working rvisors (those spending 20 percent or more of their time at tasks similar to those of employees under their supervision)	61396		
TCHBOARD OPERATOR (PBX OPERATOR; TELEPHONE SWITCHBOARD OPERATOR; ETC.): Operates cord or cordless switchboard to relay incoming, going, and interoffice calls. May supply information to callers and record messages.	61376		
CEPTIONIST (APPOINTMENT CLERK; INFORMATION CLERK; REGISTER CLERK; HOSPITAL ADMITTING CLERK; ETC.): Receives visitors coming n the establishment. Determines visitor's purpose and directs him to the proper person or department. May perform additional clerical duties such as typing,	61361		
TCHBOARD OPERATOR-RECEPTIONIST: In addition to performing duties of switchboard operator, acts as receptionist and may also type or perform ome clerical work as part of regular duties. The typing or clerical work may take part of this worker's time while at switchboard.	61377		
CRETARY (MEDICAL SECRETARY; ETC.): Schedules appointments, gives information to callers, takes and transcribes dictation, and otherwise relieves cials of clerical work and minor administrative and business detail.	61368		
NOGRAPHER: Takes dictation of correspondence, reports, and other matters, and transcribes dictated material. Performs variety of clerical duties, except n working in stenographic pool. May transcribe material from sound recordings.	61200		
PIST (INCLUDE CLERK-TYPIST): Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy. May form other clerical duties as assigned.	61392		
OKKEEPER, HAND: Keeps record of financial transactions of establishment or keeps one section or set of financial records	61307		
ENERAL CLERK (WARD CLERK, ETC.): Workers should be classified as General Clerks only if their duties are too varied and diverse to be classified in any cific office clerical occupation. Clerical duties may be assigned in accordance with the office procedures of individual establishments, and may include a mbination of bookkeeping, typing, stenography, office machine operation, etc.	61333		

EMPLOYMENT BY OCCUPATION

Occupations (1)	Occupational Code (2)	Number of Employees	
		Total (3)	Apprentices (4)
OUNTANTS AND AUDITORS (ACCOUNT AUDITOR; COST ACCOUNTANT; FIELD ACCOUNTANT; INDUSTRIAL ACCOUNTANT; PAYROLL OUNTANT, ETC.): Examines, analyzes, and interprets accounting records for the purpose of giving advice or preparing statements and installing or advising ystems of recording costs or other financial and budgetary data.	25401		
CHER, ADULT EDUCATION: Instructs out-of-school youths and adults in academic and nonacademic courses in schools or other organizations. Teaches ses, such as Americanization, fine arts, homemaking, public and business affairs, languages, and sciences.	25106		
TITION AND/OR NUTRITIONIST (DIETARY CONSULTANT; DIETETIC INTERN; DIETITIAN, ADMINISTRATIVE, ETC.): Organizes, plans, and ects food service or nutritional program to assist in promotion of health and control of disease. May administer activities of department providing quantity l service. May plan, organize, and conduct programs in nutritional research.	25434		
L WORKER (SOCIAL WORKER, MEDICAL; SOCIAL WORKER, PSYCHIATRIC; SOCIAL WORKER, CLINICAL, ETC.): Counsels and aids individuals families requiring assistance of social service agency.	25415		
CHOLOGIST (PSYCHOLOGIST, CLINICAL; PSYCHOLOGIST, INDUSTRIAL; PSYCHOLOGIST, EXPERIMENTAL, ETC.): Collects, interprets and applies tific data relating to human behavior and mental processes. Activities are in either applied fields of psychology or in basic science fields and research. *Include* [illegible] in personnel research and in administration of testing and counseling programs. *Exclude* psychiatrists.	23004		
RICAL SUPERVISOR (BILLING SUPERVISOR; STOCK CLERK SUPERVISOR; ETC.; *EXCLUDE* OFFICE MANAGER): Supervises and coordinates ac- ties of workers engaged chiefly in one type of clerical function such as typing, filing, bookkeeping, [illegible]. May assume responsibility for con- [illegible] of work assignments by clerical force being supervised and for the accuracy of completed assignments. [illegible] working ervisors (those spending 20 percent or more of their time at tasks similar to those of employees under their supervision).	61396		
TCHBOARD OPERATOR (PBX OPERATOR; TELEPHONE SWITCHBOARD OPERATOR, ETC.): Operates cord or cordless switchboard to relay incoming, going, and interoffice calls. May supply information to callers and record messages.	61376		
EPTIONIST (APPOINTMENT CLERK; INFORMATION CLERK; REGISTER CLERK, HOSPITAL ADMITTING CLERK; ETC.): Receives visitors coming the establishment. Determines visitor's purpose and directs him to the proper person or department. May perform incidental clerical duties such as typing.	61361		
TCHBOARD OPERATOR RECEPTIONIST: In addition to performing duties of switchboard operator, acts as receptionist and may also type or perform some clerical work as part of regular duties. The typing or clerical work may take part of this worker's time while at switchboard.	61377		
RETARY (MEDICAL SECRETARY; ETC.): Schedules appointments, gives information to callers, takes and transcribes dictation, and otherwise relieves [illegible] of clerical work and minor administrative and business detail.	61368		
NOGRAPHER: Takes dictation of correspondence, reports, and other matters, and transcribes dictated material. Performs variety of clerical duties, except [illegible] working in stenographic pool. May transcribe material from sound recordings.	61200		
YPIST (*INCLUDE* CLERK-TYPIST): Types letters, reports, stencils, forms, addresses, or other straight-copy material from rough draft or corrected copy. May [illegible] other clerical duties as assigned.	61392		
OOKKEEPER, HAND: Keeps record of financial transactions of establishment or keeps one section or set of financial records.	61307		
ENERAL CLERK (WARD CLERK, ETC.): Workers should be classified as General Clerks only if their duties are too varied and diverse to be classified in any pecific office clerical occupation. Clerical duties may be assigned in accordance with the office procedures of individual establishments, and may include a combination of bookkeeping, typing, stenography, office machine operation, etc.	61333		

EMPLOYMENT BY OCCUPATION

Occupations (1)	Occupational Code (2)	Number of Employees Total (3)	 Apprentices (4)
ACCOUNTANTS AND AUDITORS (ACCOUNT AUDITOR; COST ACCOUNTANT; FIELD ACCOUNTANT; INDUSTRIAL ACCOUNTANT; PAYROLL ACCOUNTANT; ETC.): Examines, analyzes, and interprets accounting records for the purpose of giving advice or preparing statements and installing or advising on systems of recording costs or other financial and budgetary data.	25401		
TEACHER, ADULT EDUCATION: Instructs out-of-school youths and adults in academic and nonacademic courses in schools or other organizations. Teaches courses, such as Americanization, fine arts, homemaking, public and business affairs, languages, and sciences.	25106		
DIETITIAN AND/OR NUTRITIONIST (DIETARY CONSULTANT; DIETETIC INTERN; DIETITIAN, ADMINISTRATIVE; ETC.): Organizes, plans, and conducts food service or nutritional program to assist in promotion of health and control of disease. May administer activities of department providing quantity food service. May plan, organize, and conduct programs in nutritional research.	25434		
CASEWORKER (SOCIAL WORKER, MEDICAL; SOCIAL WORKER, PSYCHIATRIC; SOCIAL WORKER, CLINICAL; ETC.): Counsels and aids individuals and families requiring assistance of social service agency.	25418		
PSYCHOLOGIST (PSYCHOLOGIST, CLINICAL; PSYCHOLOGIST, INDUSTRIAL; PSYCHOLOGIST, EXPERIMENTAL; ETC.): Collects, interprets and applies scientific data relating to human behavior and mental processes. Activities are in either applied fields of psychology or in basic science fields and research. *Include* occupations in personnel research and in administration of testing and counseling programs. *Exclude* psychiatrists.	23004		
CLERICAL SUPERVISOR (BILLING SUPERVISOR; STOCK CLERK SUPERVISOR; ETC.; *EXCLUDE* OFFICE MANAGER): Supervises and coordinates activities of workers engaged chiefly in one type of clerical function such as typing, filing, bookkeeping, tabulating data, etc. May assume responsibility for completion of work assignments by clerical force being supervised and for the accuracy of completed assignments. This classification does not include working supervisors (those spending 20 percent or more of their time at tasks similar to those of employees under their supervision).	61396		
SWITCHBOARD OPERATOR (PBX OPERATOR; TELEPHONE SWITCHBOARD OPERATOR; ETC.): Operates cord or cordless switchboard to relay incoming, outgoing, and interoffice calls. May supply information to callers and record messages.	61376		
RECEPTIONIST (APPOINTMENT CLERK; INFORMATION CLERK; REGISTER CLERK; HOSPITAL ADMITTING CLERK; ETC.): Receives customers coming into the establishment. Determines visitor's purpose and directs him to the proper person or department. May perform additional clerical duties such as typing.	61361		
SWITCHBOARD OPERATOR-RECEPTIONIST: In addition to performing duties of switchboard operator, acts as receptionist and may also type or perform routine clerical work as part of regular duties. The typing or clerical work may take part of this worker's time while at switchboard.	61377		
SECRETARY (MEDICAL SECRETARY; ETC.): Schedules appointments, gives information to caller, takes and transcribes dictation, and otherwise relieves officials of clerical work and minor administrative and business detail.	61368		
STENOGRAPHER: Takes dictation of correspondence, reports, and other matters, and transcribes dictated material. Performs variety of clerical duties, except when working in stenographic pool. May transcribe material from sound recordings.	61200		
TYPIST (*INCLUDE* CLERK-TYPIST): Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy. May perform other clerical duties as assigned.	61392		
BOOKKEEPER, HAND: Keeps record of financial transactions of establishment or keeps one section or set of financial records.	61307		
GENERAL CLERK (WARD CLERK; ETC.): Workers should be classified as General Clerks only if their duties are too varied and diverse to be classified in any specific office clerical occupation. Clerical duties may be assigned in accordance with the office procedures of individual establishments, and may include a combination of bookkeeping, typing, stenography, office machine operation, etc.	61333		

Appendix III

Tracking Model Documentation

EXHIBIT 1

STATE OF NEW JERSEY
DEPARTMENT OF HIGHER EDUCATION
TRENTON, NEW JERSEY 08625

OFFICE OF THE CHANCELLOR

May 7, 1976

MEMORANDUM

TO: Presidents, New Jersey Public and Independent Colleges and Universities

FROM: James M. Rosser
Vice Chancellor

SUBJECT: The Placement of Career Program Graduates (NJ DHE Survey #76-12)

The college experience has been described as a focal point for the expectations of individuals, parents, and society. These expectations include the cultivation of intellectual refinement, responsible citizenship, and career-oriented abilities that are socially useful.

Although not of singular importance, the ability of college graduates to find jobs in the fields of their choice is an indication of how well these expectations are being fulfilled. This is especially true for graduates of career, professional, and occupational programs where the link between academic preparation and employment is clear.

Information that describes the placement of graduates has great potential benefit for:

-- Students planning careers. Increasingly, students and their parents are demanding information about job opportunities available to graduates. The provision of placement data may be a step toward increasing the trust between institutions and their constituents.

-- Institutions involved in the reallocation of career program resources. Higher Education's fiscal environment no longer permits change by accretion. Rather, institutions are seeking a rational basis for the distribution of funds. Placement data are one input to the development and evaluation of career and professional programs.

-- Agents of the public. It is important to respond to the concerns of legislators and voters regarding the impact of career programs on students and society by knowing how graduates fare in the employment market.

At present, many institutions in New Jersey conduct studies of the placement of their graduates. In some cases, however, institutional and state-level planning is guided only by inference from isolated and exceptional cases. Hence, the need arises for an accurate and comprehensive statewide view of the placement of graduates.

Before responding to this need, the Department of Higher Education would first like to determine the status of the current placement efforts at the institutions. To that purpose we have prepared a brief questionnaire that does not seek new data but rather asks what placement studies are presently performed by your institution. This information, together with copies of the placement reports that you have published in the last three years, will help us to determine what additional efforts would be necessary, if any, to develop a state-level picture of the placement of career program graduates from New Jersey colleges.

Once institutional placement study efforts have been described, a statewide Placement Study Task Force will meet to discuss the need to implement late this year or early next a study of the placement of the previous year's graduates. It is hoped that such a study can draw on the existing follow-up practices at the institutions. At colleges with no formal follow-up procedures, the Task Force will assist in the development of an appropriate research methodology and a survey instrument.

The results of this survey of institutional placement activities will be incorporated with the findings of the current survey of EOF graduates to serve as a keystone in the assessment of a need for a broader placement study. Hence, I would appreciate your completing the form and returning it to the Office of Research by May 21, 1976.

I look forward to your support of this cooperative effort. If you have any questions, please call me or contact Dr. Adolph Katz, Director, Office of Research, at (609) 292-4058.

Attachment

New Jersey Department of Higher Education
Office of Research

CURRENT PLACEMENT STUDY PROCEDURES

Institution: ____________________

Respondent's Name: ____________________

Title: ____________________

Telephone: ____________________

The purpose of this brief questionnaire is to explore and describe institutional efforts to study the placement of graduates, and to evaluate the need for a comprehensive study of the placement of career, occupational, and professional program graduates. The questionnaire should take only a few minutes to complete.

I. Current Placement Study Efforts

A. Do you survey the pre-graduation employment plans of first-time graduates? Yes ☐ No ☐

If so, at what intervals? ____________________
(e.g., annually, triennially, etc.)

B. Do you survey students after graduation? Yes ☐ No ☐

If so, at what intervals? ____________________
(e.g., six months and three years)

C. Do you survey employers who have hired your graduates? (About job titles, salary, job performances, etc.) Yes ☐ No ☐

If so, how often? ____________________

D. Are placement data aggregated by:

Major program? Yes ☐ No ☐

Sex? Yes ☐ No ☐

Racial/ethnic background? Yes ☐ No ☐

E. How are placement reports and/or follow-up studies used?

Feedback to students? Yes ☐ No ☐

Institutional planning? Yes ☐ No ☐

Other? Yes ☐ No ☐

F. Which office and/or individual is responsible for placement surveys at your institution?

____

We would appreciate receiving copies of your latest placement reports to assist us in compiling a preliminary statewide report.

II. Planning for Future Placement Studies

A. Should the need exist, the Department of Higher Education plans to launch a placement study late this year or early next year. The details of this closer look will be developed in conjunction with a statewide advisory committee. In advance, however, it is important to ensure that information on June 1976 graduates is complete.

1. Do you have a mailing address where students can be reached after graduation? Yes ☐ No ☐

   If not, what plans do you have to obtain current addresses?

   ____

2. Do you have accurate information on graduates' racial/ethnic backgrounds? Yes ☐ No ☐

   If not, what plans do you have to obtain racial/ethnic data prior to graduation?

   ____

B. Please indicate the name, title, and telephone number of an individual who will represent your institution at discussions about the placement of graduates:

____

____

Please return completed questionnaire by Friday, May 21, 1976, to:

Howard F. Miller
Office of Research
New Jersey Department of Higher Education
225 West State Street
Trenton, New Jersey 08625

NJ DHE Survey #76-12

EXHIBIT 2

SURVEY OF CURRENT PLACEMENT STUDY PRACTICES AT NEW JERSEY COLLEGES AND UNIVERSITIES

Institutional studies of postgraduation activity in New Jersey are common. All public institutions (with the exception of Rutgers, New Brunswick, and two County Colleges, Passaic and Salem) conduct some kind of routine survey of postgraduation activities. Tables I, II, and III report the extent to which institutions survey their graduates.

The intervals at which institutional surveys are conducted were considered important in assessing the utility of institutional placement data in the construction of a statewide view. It is apparent from Table IV that institutions survey their students at widely varying intervals. Placement rates obtained from polling graduates three months after graduation will differ from the rates of surveys conducted after six months or a year. Table IV illustrates that among the county colleges, at least ten separate survey administration intervals exist. Whereas this finding in no way impungns institutional efforts to develop base-line placement data for good internal use, the comparative value of these data at the state level would be misleading.

In the event that one were to correct somehow for variations in survey administration time, another limitation would persist--i.e., the extent to which institutions validate their responses by sampling non-respondents. The following quotation is an all too rare example of an institution that addressed the matter of response validation in its report: "The degree to which this sample of returns does produce a response bias, however, is not known." Without some assurance that this crucial step in the survey method has been taken, or at least that response rates are acceptably high, the results remain open to question.

In several cases, institutions have not displayed placement rates side by side with numbers of students graduated in each field. Hence, a simple tabulation of numbers of graduates who attained jobs creates the illusion that the program has experienced a degree of success. Another limitation is the lack of aggregated data by sex and racial/ethnic background. As state-level agencies assess the role of higher education institutions as a social force, these data assume greater importance. The Department of Higher Education's survey of present practices revealed that only one state college, two independent colleges, and two county colleges aggregated their placement data by racial/ethnic background. When asked whether institutions kept accurate information about racial/ethnic background of graduates, responses were largely negative (See Table V).

The survey indicates further that placement studies are conducted by a variety of internal institutional offices (Table VI). For example, five separate county college offices may be responsible for postgraduation studies among the seventeen institutions. Whereas this is certainly not an impediment to obtaining an institutional view, such studies, when aggregated, are likely to yield varied information of the kind that each initiating office deems important.

Table I

Which Public Four-Year New Jersey Institutions Currently Conduct Follow-Up Studies of their Graduates?

FOUR-YEAR COLLEGE	Conducts Pre-Graduation Survey	Conducts Post-Graduation Survey	Routinely Surveys Employers	Sent DHE Copies of Reports
State Colleges				
Glassboro	yes	yes	yes	yes
Jersey City	yes	yes	yes	yes
Kean	no	yes	no	yes
Montclair	yes	yes	?	no
Ramapo	yes	yes	no	no
Stockton	yes	yes	no	yes
Trenton	no	yes	no	yes
Wm. Paterson	no	yes	yes	no
Sub-Total State Colleges	5 yes 3 no	8 yes	3 yes 4 no 1 ?	5 yes 3 no
Rutgers University				
Newark	yes	yes	no	yes
New Brunswick	yes	no	no	yes
Camden	no	yes	yes	yes
New Jersey Institute of Technology	yes	yes	yes	yes

Table II

Which County Colleges Currently Conduct Follow-Up Studies of their Graduates?

COUNTY COLLEGE	Conducts Pre-Graduation Survey	Conducts Post-Graduation Survey	Routinely Surveys Employers	Sent DHE Copies of Reports
Atlantic	yes	yes	yes	yes
Bergen	no	yes	no	no
Brookdale	no	yes	yes	yes
Burlington	no	yes	no	no
Camden	yes	yes	yes	no
Cumberland	yes	yes	yes	yes
Essex	yes	yes	yes	yes
Gloucester	yes	yes	no	yes
Mercer	yes	yes	no	yes
Middlesex	yes	yes	yes	yes
Morris	yes	yes	yes	yes
Ocean	no	yes	no	no
Passaic	no	no	-	no
Salem	yes	no	yes	no
Somerset	yes	yes	yes	yes
Union	no	yes	yes	no
U.C.T.I.	yes	(1)	(1)	yes
Sub-Total	11 yes	14 yes	10 yes	10 yes
County Colleges	6 no	2 no	5 no	7 no

(1) Varies with the program.

Table III

Which Independent Colleges Currently Conduct Follow-Up Studies of their Graduates?

INDEPENDENT COLLEGES	Conducts Pre-Graduation Survey	Conducts Post-Graduation Survey	Routinely Surveys Employers	Sent DHE Copies of Reports
Assumption	yes	yes	yes	no
Centenary	yes	yes	yes	no
Fairleigh Dickinson	no	yes	no	no
Felician	(1)	yes	(2)	no
Georgian Court	yes	yes	no	no
Monmouth	yes	yes	yes	no
Princeton	yes	no	no	yes
Rider	no	yes	yes	yes
St. Elizabeth	yes	yes	no	no
St. Peter's	yes	yes	no	yes
Stevens	yes	no	no	yes
Sub-Total	8 yes	9 yes	4 yes	4 yes
Independent	2 no	2 no	6 no	7 no

(1) No pre-graduation survey for elementary education majors--only liberal arts majors.

(2) Employers of elementary education graduates are surveyed; employers of liberal arts graduates are not.

Table IV

Variation in the Survey Interval Among Institutions Conducting Follow-Up Studies

INSTITUTIONAL SECTOR	Institutions Conduct Follow-Up Surveys Every:
A. State Colleges	1. Five years 2. Six months, five years 3. After three months 4. Variable 5. Six and eight months after graduation 6. Five times following graduation 7. At three, six, and nine month intervals after graduation
B. County Colleges	1. Six months, five years 2. Nine months, twenty-eight months 3. Six months, one year 4. One year, three years, five years 5. Annually 6. One year, five years 7. One year, four years 8. Six months only 9. Three months, three years 10. Varies with the program
C. Rutgers	1. Two months after graduation 2. Three months after graduation
D. New Jersey Institute of Technology	1. Upon graduation and at five and ten year intervals
E. Independent Colleges	1. One year later 2. During the first year 3. After six months 4. After three months 5. After three years 6. Just prior to graduation only 7. Three months and six months

Table V

Aggregation of Placement Data by Major Program, Sex, and Racial/Ethnic Background

INSTITUTIONAL SECTOR	Are Placement Data Aggregated By:			Do you have accurate information on racial ethnic background of students?
	Major Program?	Sex?	Racial/Ethnic Background?	
State Colleges	7 yes 1 no	1 yes 7 no	1 yes 7 no	3 yes 5 no
Rutgers	3 yes 0 no	1 yes 2 no	0 yes 3 no	0 yes 3 no
NJIT	yes	no	no	no
County Colleges	14 yes 3 no	3 yes 14 no	2 yes 15 no	12 yes 6 no
Independent Colleges	11 yes 0 no	4 yes 7 no	2 yes 9 no	5 yes 5 no

Table VI

Which Institutional Office is Responsible for Placement Studies?

INSTITUTIONAL OFFICE	Number
A. State Colleges	
Career Planning and Placement	7
Office of Institutional Research	1
	8
B. County Colleges	
Dean of Students	4
Career Planning and Placement	7
Office of Institutional Research	4
Office of the President	1
Vice President for Administration	1
	17
C. Rutgers University	
Career Planning and Placement	3
D. New Jersey Institute of Technology	
Placement Office	1
E. Independent Colleges	
Student Services	1
Placement Office	7
Academic Dean	1
Executive Vice President	1
Associate Provost	1
	11

EXHIBIT 3

STATE OF NEW JERSEY
DEPARTMENT OF HIGHER EDUCATION
TRENTON, NEW JERSEY 08625

OFFICE OF THE CHANCELLOR

February 24, 1977

MEMORANDUM

TO: Presidents, New Jersey Colleges and Universities

FROM: Chancellor Ralph A. Dungan

SUBJECT: Proposed Study of the Postgraduation Activities of New Jersey College and University Students

The widespread problems encountered by college graduates entering the job market and the need to develop measures of performance outcomes have focused public attention on the economic advantages of the college degree and, more generally, on questions about the benefit of a college education. Although the educational community has been able to reply to many of these questions from a philosophical point of view, our responses will have greater impact if supported by systemwide data about the post-college pursuits of our graduates.

In order to provide career information that will both benefit the counseling of students and improve New Jersey higher education, I ask your cooperation in initiating a study of the postgraduation activities of our college students. The attached proposal describes a longitudinal study of graduates of New Jersey public and independent colleges and universities. To facilitate this effort, the development costs will be borne by the Department of Higher Education. In addition, we will also support the follow-up of Spring 1976 graduates four years later. Your involvement will be requested only to furnish address labels for your Spring 1976 graduates and, of course, to provide thoughtful input to the study.

Last year, the Department surveyed institutional efforts to describe the activities of their graduates. The results of this survey are presented as Appendix B of the attached proposal. At that time you appointed a liaison person to represent your institution in discussions about the study and its implementation. In order that we may mail the first round of questionnaires by May 1977, a member of my staff

February 24, 1977

will be contacting your designated representative to coordinate the details of the project.

I look forward to your cooperation in this important study. Please transmit your comments and suggestions either directly to me or to Howard Miller, Assistant Director, Office of Research: (609) 292-4057.

Attachment

STUDY OF POSTGRADUATION ACTIVITIES

Overview

1. The Problem

The job plight of college graduates has raised questions about the value of a college education. Increasingly, representatives of colleges and state-level coordinating agencies have been asked to provide specific information about the entry of graduates into both the job market and the ranks of those seeking further schooling. Unfortunately, we have been less than adequately prepared to answer their questions.

2. The Purpose

The purposes of this study are: (1) to provide information for students, counselors, and educational planners about the careers pursued by college graduates, and (2) to improve educational services for New Jersey college students. To these ends, the Department of Higher Education proposes a biennial survey of the postgraduation activities of associate, baccalaureate, masters, doctoral, and professional degree graduates of New Jersey colleges, commencing with the graduates of Spring 1976.

3. Questions for Research

Among the questions that will be addressed in the study are the following: Of the graduates at each degree level and institution, what percentages are employed and what percentages seek additional schooling? Of those employed, how many are working in their field of preparation? How do graduates perceive the contribution of their educational preparation to their employment or further schooling? Are there differences in postgraduation activity by race, sex, program, institution, and geographic sector?

4. Scope and Method

Every other year, a sample of the Spring graduates of New Jersey public and independent institutions will be surveyed one year and four years after graduation.

5. Implementation

The first administration of the survey will occur in Spring 1977 with questionnaires mailed to Spring 1976 graduates.

STATEWIDE STUDY OF POSTGRADUATION ACTIVITIES OF NEW JERSEY COLLEGE STUDENTS

A Proposal

I. INTRODUCTION

A. The Problem

It is known widely that college graduates in many fields are having difficulty finding suitable employment. The state of the economy, the number of young people in the population, the share of that number holding advanced degrees, and the improved eligibility of women and minorities for equal positions in the labor force indicate that the pressures to find a job undoubtedly will intensify.[1] At the same time, college students, institutional planners, and state-level policy makers nationwide have had little access to information about the postgraduation experiences of college students.

As a result, institutions and state coordinating agencies (notably Florida, Indiana, Kansas, Maryland, Pennsylvania, and Tennessee) have begun to follow more actively the career development of students and the fulfillment of their expectations after graduation. While there are limitations to the use of graduate activity information in the planning of careers and in the measure of educational effectiveness, these data are seen as an important contribution to an understanding of the outcomes of higher education.[2]

B. Purpose of the Study

In order to provide systemwide career data for students and counselors, and to furnish information that will improve institutional and state-level planning and evaluation, the Department of Higher Education proposes a biennial study of the postgraduation activities of recipients of associate, baccalaureate, masters, doctoral, and professional degrees in New Jersey, to commence with a survey of Spring 1976 graduates. The results of the study will serve specifically the needs of the following clientele:

1. Students and Career Counselors. Individual career decisions are enhanced when students have access to better career information. It is believed also that college students ought to know about their

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[1] Toombs, W. "Career Education and Undergraduate Study." Research Currents. Washington, D.C.: American Association for Higher Education, November 1976.

[2] For an additional comment on the relationship between college and employment, see Appendix A, page 6.

prospects for finding a job at the end of the line. As such, Barton (1975), among others, has charged institutions with the responsibility for helping students adjust their expectations to "the dimensions of current reality" (p. 280).[3]

2. Institutional Planners. Faculty and administrators involved in the evaluation of programs (particularly in the career, occupational, and professional fields) and in the allocation of scarce resources need information about what happens to their graduates. This study, to be conducted at no cost to participating institutions, is seen as a step toward guiding the establishment of institutional priorities in the late seventies and eighties.

3. State-level Planners. Policy makers are looking to placement information as one indicator of the match between the output of educated manpower and their absorption into both the labor force and the ranks of those seeking further schooling. However complex the issue, the results of this study will be viewed as a responsible answer to public and institutional concern about the impact of college on students and society.

The study is expected to address these more specific questions:[4]

Characteristics of Graduates - What are the characteristics of graduates at each institution and degree level in terms of sex, age, and racial/ethnic background?

Career Alternatives - Of those graduates at each degree level, what percentage continues to additional schooling and where, what percentage enters employment in what fields and where, and what percentage, if any, is neither employed nor in school, and why?

Employment - Of those seeking and entering employment, what percentage is satisfied with their employment conditions? How many graduates are working in their field of preparation, and how many are working out of their field, and why? How satisfied are graduates with the preparation they received for work?

Education - What percentage of graduates at various degree levels go on to further study, and where? How do graduates evaluate the contribution of their former educational preparation to their current educational activity?

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[3] Barton, P.E. "Human Resources, The Changing Labor Market, and Undergraduate Education." Liberal Education 61 (May 1975): 275-284.

[4] Adapted from: "Preliminary Proposal for Survey of Recent College Graduates." Nashville: Tennessee Higher Education Commission, 1974.

C. Need for a State-level View

It has been suggested that a comprehensive picture of postgraduation activity in New Jersey can be assembled from existing institutional reports on the subject. Before recommending a large state-level effort, the Department of Higher Education surveyed the current placement study activities among New Jersey institutions. It was believed that a finding of consistency in both method and procedure, at least across institutional sectors, would obviate the need for a similar initiative by the Department. As part of the survey, copies of the latest institutional placement reports were reviewed.

It was found that many institutions have mounted postgraduation activities studies of great local utility. Nevertheless, the use of widely differing survey intervals and procedures, the frequent absence of a validation of respondent samples, and the lack of information about the sex and racial/ethnic background of graduates precludes an aggregation of institutional data.[5]

II. RESEARCH METHOD

A. Design and Procedures

It is proposed, therefore, that every other year the Department of Higher Education survey a sample of Spring graduates with associate, baccalaureate, masters, doctoral, and professional degrees from New Jersey public and private institutions. The study will be longitudinal in nature with the first follow-up conducted approximately one year after graduation, and the second occurring four years later. The initial target population will be the Spring 1976 graduates, who will be surveyed in Spring 1977.

Because of the breadth of the study, vigorous efforts to increase student response rates and to validate the representativeness of the responses will be necessary. To this end, two questionnaire mailings and a postcard reminder are planned. A telephone survey of non-respondents will be used to enhance validity.

B. The Survey Instrument

A preliminary version of the survey instrument is presented in Appendix C, page 15. The questionnaire will be revised by an advisory committee, comprising representatives of each institutional sector, in order to reflect the needs of colleges.

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[5] For more detailed results of the DHE survey, see Appendix B, page 7. See also Williams, W.G., and Snyder, F.A. Follow-Up Studies of Former Occupational-Technical Students at County Colleges." Richmond: Virginia Department of Community Colleges, 1974. In this study, the authors state that less than half of Virginia's community colleges conducted formal studies resulting in written reports.

In addition, procedures will be established to aid the respondents and the participating institutions. The survey instrument will be reduced to a manageable size, with the return address visible. Respondents need only tape the edges and place the completed questionnaire in the mail. The anonymity of respondents will be safeguarded by establishing two data tapes--one for personally identifiable information to be used as part of the follow-up four years hence, and one for the raw placement data. A separate vendor (possibly the New Jersey Educational Computer Network) will serve as the repository for completed questionnaires; no personally identifiable information will appear in the final report.

Expenses incurred in the design of the study, the printing and mailing of questionnaires, and the analysis of results will be borne by the Department of Higher Education. As a further benefit to institutional personnel, pertinent portions of the data tape will be available for closer study. Each institution will be called upon to make informed input to the design and implementation, and to provide mailing labels.

C. Schedule for Implementation

February 1977	(1) Final survey plans prepared and approved by participating DHE Office Directors.
	(2) Proposal explaining the purposes and benefits of the study sent to college presidents and to their representatives to the Postgraduation Activities Study Advisory Group.
	(3) Meeting held with Postgraduation Activities Study Advisory Group to discuss purposes and procedures. (See Appendix D, page 20, for list of names.)
March	(4) Survey instrument pretested and finalized.
	(5) Data processing contract drafted.
	(6) Address labels submitted by institutions to the DHE Office of Research.
April	(7) Survey instrument printed.

May/June	(8) First questionnaire mailing completed.
	(9) First and second follow-up mailings completed.
	(10) Returns edited, coded, and keypunched.
	(11) Telephone follow-up of non-respondent sample conducted.
July	(12) Data analysis and preparation of output tables for institutions and the Department of Higher Education.
	(13) Meeting of Postgraduation Activities Study Advisory Group to discuss survey results.
Fall 1977	(14) Preparation and dissemination of the final report.

APPENDIX A

COMMENTS ON THE RELATIONSHIP BETWEEN EDUCATION AND JOB PLACEMENT

The problem of constructing a comprehensive view of postgraduation activities is clouded by conflicting views of the collegiate role. On the one hand, there are those, of whom the most seasoned and articulate spokesman is Robert Maynard Hutchins, who view higher education institutions almost exclusively as cultivators of moral qualities, intellectual honesty, the love of truth, and the ability to think clearly. At the opposite end of the spectrum are those who perceive higher education solely as an avenue to a better job and a higher salary.

It would be difficult to argue that elements of both positions do not pervade the expectations of college students. Although the intent was not stated then in vocational terms, the American colonial college honored among its principal charges the development of competent rulers and a learned clergy. In the fifties and sixties, few colleges were observed to discourage the notion of higher education as an open road to social mobility, a better job, and a more gratifying investment of one's life effort. Whereas the strengths of the relationship between education and employment have and will continue to vary with each curriculum, the growth of both career-oriented programs at the community colleges and professional curricula at the four-year colleges and universities has tightened the link further.

Nonetheless, the preceding discussion deserves a brief comment on the use of placement data as an "outcome measure" of the educational process. The number or percentage of students finding employment in a given field may be viewed also as an outcome measure of the state of the economy, the job market within a given field, the talent of the individual in "playing" the employment market, the shifting of life-styles (i.e., the preference of many students to take some time off after graduation), the full range of the job-seeker's abilities, and others. Moreover, low employment rates in a given year may be the result of an overproduction of trained manpower several years earlier. It is possible, therefore, that a program or a college could be viewed negatively for having filled the local market with well-qualified graduates. Clearly, any evaluation of program quality that was made on the basis of employment data alone would be shortsighted.

In sum, we can measure job placement rates; but we cannot answer satisfactorily the question: Outcomes of what?

APPENDIX B

SURVEY OF CURRENT PLACEMENT STUDY PRACTICES AT NEW JERSEY COLLEGES AND UNIVERSITIES

Institutional studies of postgraduation activity in New Jersey are common. All public institutions (with the exception of Rutgers, New Brunswick, and two County Colleges--Passaic and Salem) conduct some kind of routine survey of postgraduation activities. Tables I, II, and III report the extent to which institutions survey their graduates.*

The intervals at which institutional surveys are conducted were considered important in assessing the utility of institutional placement data in the construction of a statewide view. It is apparent from Table IV that institutions survey their students at widely varying intervals. Placement rates obtained from polling graduates three months after graduation will differ from the rates of surveys conducted after six months or a year. Table IV illustrates that among the county colleges, at least ten separate survey administration intervals exist. Whereas this finding in no way impugns institutional efforts to develop baseline placement data for good internal use, comparisons of these data at the state level would be misleading.

In the event that one were to correct somehow for variations in survey administration time, another limitation would persist--the extent to which institutions validate their findings by sampling non-respondents. The following quotation is an example of an institution that addressed the matter of response validation in its report: "The degree to which this sample of returns does produce a response bias, however, is not known." Without some assurance that this crucial step in the survey method has been taken, or at least that response rates are acceptably high, the results remain open to question.

In several cases, institutions have not displayed placement rates side by side with numbers of students graduated in each field. Hence, a simple tabulation of numbers of graduates who attained jobs creates the illusion that the program has experienced a degree of success. Another limitation is the lack of aggregated data by sex and racial/ethnic background. As state-level agencies assess the role of higher education institutions as a social force, these data assume greater importance. The Department of Higher Education's survey of present practices revealed that only one state college, two independent colleges, and two county colleges aggregated their placement data by racial/ethnic background. When asked whether institutions kept accurate information about racial/ethnic backgrounds of graduates, responses were largely negative (See Table V).

The survey indicates further that placement studies are conducted by a variety of internal institutional offices (Table VI). For example, five different county college offices may be responsible for postgraduation studies among the seventeen institutions. Whereas this is certainly not an impediment to obtaining an institutional view, such studies, when aggregated, are likely to yield varied information of the kind that each initiating office deems important.

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*Based on data obtained from New Jersey DHE Survey #76-12.

APPENDIX C

DRAFT

POSTGRADUATION ACTIVITIES QUESTIONNAIRE

PREAMBLE

As a recent graduate of a New Jersey college or university, you are in a good position to help us assess how well educational programs are serving the public.

We are asking you to devote 5 or 10 minutes to filling out this questionnaire. The form requires, for the most part, that you check the appropriate option for each question. If you prefer not to answer a question, please complete the other items.

When you have completed the questionnaire, fold the card so that only the New Jersey Educational Computer Network address is visible, secure it with the gummed label provided, and mail it as soon as possible. Postage is prepaid. Your name and address are requested to allow us to follow-up your responses three years later. Your identity will not be reflected in any reports or uses of the data, and all information will be kept confidential.

Please take this time to help us learn from your experience so that we can make New Jersey colleges and universities more effective in their service to students.

APPENDIX C

DRAFT

POSTGRADUATION ACTIVITIES QUESTIONNAIRE

Number of Card Columns

A. Precoded Items / / / / / / / / / / (8)

1. Institution ______________________________ 2

2. Degree Received 1

   ☐ 1. Certificate
   ☐ 2. Diploma (Other than those listed below)
   ☐ 3. Associate Degree
   ☐ 4. Bachelor's Degree
   ☐ 5. Master's Degree
   ☐ 6. Professional Degree (Includes only dentistry, medicine, optometry, osteopathy, podiatry, veterinary medicine, law, and theology.)
   ☐ 7. Doctorate (Ph.D., Ed.D., D.B.A.)
   ☐ 8. Other (please specify)

   ____

3. Field of Study (Major) ___________________ 2
   (List provided)

4. Identification/Tracking Number / / / / 3
   (Suffix)

Subtotal 8

B. Biographical Data

5. Name / (Last) /(15) / (First) /(10) 25

6. Current Mailing Address 42

   /________________/(16) /________________/(16)
   Number & Street City/Township

   /____/(5) /____/(5)
   State Zip

7. State of Residence at Time of Initial Enrollment 2

   ☐ New Jersey
   ☐ New York or Pennsylvania
   ☐ Other

8. Racial/Ethnic Background 1

   ☐ 1. Black, Afro-American
   ☐ 2. Puerto Rican
   ☐ 3. Cuban
   ☐ 4. White, Caucasian
   ☐ 5. Oriental
   ☐ 6. Asian American
   ☐ 7. Other Hispanic

Number of Card Columns

9. Were you a recipient of an Educational Opportunity (EOF) award? 1

☐ Yes
☐ No

10. Sex 1

☐ Male
☐ Female

11. Year of Birth 2

Subtotal 74

1 9 __ __

C. Current Occupation/Education

12. Are you currently: (check all that apply) 3

☐ 1. Employed full-time
☐ 2. Employed part-time
☐ 3. Full-time student
☐ 4. Part-time student
☐ 5. Seeking employment
☐ 6. None of the above (i.e., inactive)

13. If employed,

A. Location: 2

________ (County, if N.J.) ________ (State) /__/__/ /__/__/

B. Occupation: 2
(enter two-digit code from enclosed list)

/__/__/

C. Is current occupation: (please check one) 1

☐ 1. Same as field prepared for at or above expected level of responsibility

☐ 2. Same as field prepared for at lower level of responsibility

In field other than prepared for, due to:

☐ 3. Own choice
☐ 4. Certification or licensure needed
☐ 5. Further formal education required
☐ 6. Difficulty in finding a job in occupation prepared for
☐ 7. Other (please specify)

____

Number of Card Columns

14. How did you locate your job? (please check one) 1

☐ 1. Not employed (Not applicable)
☐ 2. Employed at job while completing my education
☐ 3. School placement officer
☐ 4. College instructor
☐ 5. Professional periodicals or organizations
☐ 6. Public or private employment agency
☐ 7. Newspaper advertisement
☐ 8. Direct application to employer
☐ 9. Friends or relatives

15. If employed full-time (35 hrs. per week or more), what is your approximate current gross annual salary? 5

$/ / / / / /(5)

16. A. Are your currently pursuing an additional college/degree certificate? (please check one) 1

☐ 1. No
☐ 2. Yes, Certificate
☐ 3. Yes, Diploma (Other than those listed below)
☐ 4. Yes, Associate Degree
☐ 5. Yes, Bachelor's Degree
☐ 6. Yes, Master's Degree
☐ 7. Yes, Professional Degree (e.g., M.D.)
☐ 8. Yes, Doctorate (e.g., Ph.D.)
☐ 9. Other (please specify)

B. If yes, location? 1

☐ New Jersey
☐ New York or Pennsylvania
☐ Other state (specify, if known)

C. Is additional college degree/certificate

☐ 1. Directly related to previous degree received?
☐ 2. Somewhat related?
☐ 3. Not related at all?

Number of Card Columns

17. Satisfaction with academic preparation toward degree received in Spring 1976: 1

☐ 1. Highly satisfied
☐ 2. Generally satisfied
☐ 3. Generally dissatisfied
☐ 4. Highly dissatisfied

Subtotal 17

18. Please use the space below for additional comments about your academic preparation and its relevance to your current post-graduate endeavors.

If you are a health professional, please answer Questions 19, 20, and 21 below.

19. Do you hold certification or registration with a national professional/certifying association? 1

☐ Yes
☐ No

If yes, what is your designation? 2

____
(e.g., ASCP/MT, RRT)

20. What is your major employment setting? (please check one) 1

☐ 1. Hospital, nursing home, or other institution
☐ 2. Private practitioner's office
☐ 3. School (teaching)
☐ 4. School (non-teaching)
☐ 5. Community (public health)
☐ 6. Business/industry
☐ 7. Private medical/dental laboratory
☐ 8. Armed services
☐ 9. Other (specify)

		Number of Card Columns
21. Please specify the number of hours per week you spend doing the following in your job?		10
	Hours	
☐ 1. Direct patient care (e.g., bedside, rehab.)	/__/__/	
☐ 2. Indirect patient care (e.g., lab work)	/__/__/	
☐ 3. Administration/supervision	/__/__/	
☐ 4. Research	/__/__/	
☐ 5. Teaching	/__/__/	
	Subtotal	14
	Grand Total	113

Kindly fold this questionnaire so that only the (to be determined) address is visible, secure with gummed label, and mail. Postage is prepaid.

APPENDIX D

LIAISON REPRESENTATIVES

POSTGRADUATION ACTIVITIES STUDY

Institution	Name and Title	Telephone
Glassboro State College	Mr. Donald W. Mumford Director, Career Planning & Placement	(609) 445-5281
Jersey City State Coll.	Mr. Frank L. Capone, Director Academic Career Planning & Placement	(201) 547-6000
Kean College	Mr. Joseph A. Vitale Director, Academic Career Planning & Placement	(201) 527-2000
Montclair State College	Dr. William Faricy, Director Institutional Research	(201) 893-4425
Ramapo College	Ms. Pamela M. Bischoff Director, Career Planning & Placement	(201) 825-2800 Ext. 378
Stockton State College	Ms. Susan Schumacher Assistant Director, Financial Aid for Career Planning	(609) 652-2255
Trenton State College	Dr. Michael S. Kline Director, Adademic Career Planning & Placement	(609) 771-1855
Wm. Paterson College	Ms. Narda Riese-Kearney Director, Career Counseling & Placement	(201) 881-2441
New Jersey Institute of Technology	Mr. John Schmid, Director Placement Office	(201) 645-5202
Rutgers University New Brunswick Campus	Dr. Glenn W. Gamble, Director Career Development & Placement Services	(201) 932-7285
Rutgers University Camden Campus	Ms. Mary Lee Hassall, Director Career Planning & Placement	(609) 757-6046
Rutgers University Newark Campus	Ms. Adele A. Kaplan, Director Counseling & Career Development and	(201) 648-5805
	Mr. John Feinler, Jr. Placement Officer	(201) 648-5311
College of Medicine & Dentistry of N.J.	(to be selected)	

LIAISON REPRESENTATIVES

POSTGRADUATION ACTIVITIES STUDY

Institution	Name and Title	Telephone
Atlantic	Mr. William W. Kaenzig Dean of Students	(609) 625-2545
Bergen	Professor Carol Pogano Coordinator of Financial Aid, Career Counseling & Placement	(201) 447-1500 Ext. 354
Brookdale	Mr. Harvey B. Schmelter Director, Career Services	(201) 842-1900
Burlington	Dr. G. L. Mears, Director Research & Planning	(609) 894-9311 Ext. 246
Camden	Mr. Martin W. Schwartz Director, Research & Development	(609) 227-7200 Ext. 351
Cumberland	Mr. Sidney Steinour, Director Cooperative Education & Placement Services	(609) 691-8600
Essex	Ms. Wanda Boykin Placement Officer	(201) 877-3022
Gloucester	Mr. Wesley L. Fisher Placement Counselor	(609) 468-5000 Ext. 212
Hudson	Mr. Peter Alicandri Director, Student Services	(201) 656-2020
Mercer	Dr. E. Timothy Lightfield Dean for Planning, Management, & Information	(609) 586-4800 Ext. 212
Middlesex	Mr. John Herrling, Director Job Placement	(201) 548-6000 Ext. 255
Morris	Mr. Joseph P. Nazzaro Director, Placement & Financial Aid	(201) 361-5000 Ext. 256
Ocean	Mr. Harry W. Ash, Assistant Dean of Students	(201) 255-4000 Ext. 230
Passaic	Dr. Gustavo A. Mellander President	(201) 279-5000

Institution	Name and Title	Telephone
Salem	Mr. Thomas R. Sundstrom Dean of Students	(609) 299-2100 Ext. 8
Somerset	Mr. P. Van Blarcom Coordinator, Office of Institutional Research	(201) 526-1200 Ext. 207
Union	Mr. Edward Udut, Director Office of Institutional Research & Planning	(201) 276-2600 Ext. 217
Union County Technical Institute	Dr. Joshua S. Chow, Vice President, Business & Finance	(201) 889-2000 Ext. 306
Assumption		
Centenary	Mr. Albert W. Parsons Director, Student Services	(201) 852-1400
Fairleigh Dickinson Madison Campus	Ms. Helen Sauper Director of Student Placement	(201) 377-4700
Fairleigh Dickinson Rutherford Campus	Ms. Genevieve Halk Director, Career Services	(201) 933-5000
Fairleigh Dickinson Teaneck Campus	Ms. Elizabeth Clodfelter Director, Career & Counseling	(201) 836-6300
Felician	Dr. Marie T. Callahan Director, Liberal Arts	(201) 778-1190 Ext. 65
Georgian Court	Ms. Ruth Folker, Director Career & Personal Counseling	(201) 364-2200 Ext. 25
Monmouth	Mr. Robert C. Lillie Director, Placement	(201) 222-6600 Ext. 256
Northeastern	Dr. Wesley A. Olsen Executive Vice President	(201) 226-1074
Princeton Theological	Dr. Arthur M. Byers Secretary of Seminary	(609) 921-8300
Princeton University	Mr. Newell Brown, Director Director, Career Services	(609) 452-3325
Rider College	Dr. J. Barton Luedeke Associate Provost	(609) 896-0800 Ext. 204

Institution	Name and Title	Telephone
College of St. Elizabeth	Ms. Julia E. Read Director, Career Counseling & Placement	(201) 539-1600
St. Peter's College	Mr. William K. Stoms, Jr. Career Development Center	(201) 333-4400 Ext. 277
Stevens Institute	Mr. Lawrence A. Minck Director, Career Planning & Placement	(201) 792-2700
Westminster Choir College	Mr. Steven P. Sharpe Director, Alumni & Career Services	(609) 921-3201

STATE OF NEW JERSEY
Department of Higher Education

EXHIBIT 4

DRAFT

POSTGRADUATION STUDY

IF LABEL IS NOT CORRECT,
PRINT CORRECTIONS BELOW:

PLEASE READ EACH QUESTION CAREFULLY AND CIRCLE THE NUMBER NEXT TO YOUR ANSWER (FOR EXAMPLE ①).

1. What was the highest degree you received from a New Jersey college or university in 1976? Please circle the number next to your answer.

    1 Certificate or diploma, but not degree
    2 Associate degree
    3 Bachelor's degree
    4 Master's degree
    5 Doctoral degree (Ph.D., Ed.D., etc.)
    6 First-Professional degree (D.D.S., D.M.D., M.D., LL.B., J.D., or theological degree)

2. What was the date of the above degree?

    1 January-February, 1976
    2 March-April, 1976
    3 May-June, 1976
    4 July-August, 1976
    5 September-October, 1976
    6 November-December, 1976

3. Which statement best describes your main objective in pursuing the degree you received in 1976? (circle only one)

    1 Personal and intellectual development
    2 To update or upgrade job skills
    3 To prepare for further education
    4 To prepare for immediate employment in a particular occupation
    5 To prepare for immediate employment, but not necessarily in a particular field
    6 Other (describe) ______________________________

4. Considering your goals, how satisfied were you with the program?

   1 Very satisfied
   2 Satisfied
   3 Neutral
   4 Disappointed
   5 Very disappointed

5. Were you enrolled full-time or part-time while working towards your 1976 degree? (circle only one)

   1 Full-time throughout
   2 Part-time or summers throughout
   3 Mainly full-time
   4 Mainly part-time

6. During the last two semesters you were enrolled, were you employed in a job related either to your program of studies or to your present occupational field? (circle one)

   1 Yes, was employed in job related to my studies and/or present occupation
   2 Was employed in different field
   3 Was not employed

7. Prior to receiving your 1976 degree, were you ever employed in a job related to the field in which you obtained the degree?

   1 Yes 2 No

8. Since receiving the degree, have you been employed in a job related to the degree?

   1 Yes 2 No

9. Do you hold permanent state-issued certification in the field of education? Please indicate when you obtained your first permanent certification as a teacher, counselor, etc. (circle one)

   1 Obtained first permanent certification at time of 1976 degree
   2 Took additional courses after 1976 degree and then obtained first permanent certification
   3 Held first permanent certification before 1976 degree
   4 No, do not hold permanent certification

PLEASE INDICATE STATE(S) IN WHICH YOU HOLD PERMANENT CERTIFICATION:

1 N. J. only 2 Other state(s) only 3 N. J. and other(s)

10. Do you hold a degree in a health professions field?

1 Yes → PLEASE ANSWER QUESTIONS 11-13
2 No → SKIP TO QUESTION 14 BELOW

11. Do you hold a state-issued license to practice in a health professions field?

1 Yes, in N. J. only
2 Yes, in other state(s) only
3 Yes, in N. J. and other(s)
4 No

12. Are you registered or certified by a national health professions organization or association?

1 Yes (specify name of organization) ____________________
2 No

13. If you're currently employed in the health professions, please indicate the work setting in which you spend most of your time. (circle one)

1 Hospital
2 Community clinic
3 Nursing home
4 Private laboratory
5 Private practitioner's office
6 Industrial or business firm
7 School or college
8 Other health setting (specify) ____________________
9 Not employed in health field

14. Are you currently taking any college or university courses?

1 Yes, full-time
2 Yes, part-time
3 No

15. Are you currently matriculated in a degree program?

1 Yes 2 No

If yes, is your present program related to the field in which you obtained your 1976 degree?

1 Yes, directly or closely related
2 Yes, somewhat related
3 No, in different field

OVER PLEASE! →

16. Which statement best describes your present employment status?

1 Employed, full-time
2 Employed, part-time
3 Military, full-time active duty
4 Unemployed, seeking employment
5 Not available for employment

(4, 5) → PLEASE SKIP TO QUESTION 20

17. Is your present job related to the field in which you obtained your 1976 degree?

1 Yes, directly or closely related
2 Yes, somewhat related
3 No, in different field

18. Did your 1976 degree help you obtain your present job or advance in your field?

1 Degree was required
2 Degree helped considerably
3 Degree helped somewhat
4 Degree didn't help at all

19. Where are you employed? If you have more than one job, please indicate your main place of employment.

1 New Jersey
2 New York State
3 Pennsylvania
4 Other state

IF EMPLOYED IN NEW JERSEY, PLEASE INDICATE THE COUNTY:

1 Atlantic
2 Bergen
3 Burlington
4 Camden
5 Cape May
6 Cumberland
7 Essex
8 Glouster
9 Hudson
10 Hunterdon
11 Mercer
12 Middlesex
13 Monmouth
14 Morris
15 Ocean
16 Passaic
17 Salem
18 Somerset
19 Sussex
20 Union
21 Warren

EVERYONE SHOULD ANSWER QUESTIONS 20 AND 21. THIS INFORMATION IS NEEDED FOR EQUAL OPPORTUNITY PROGRAMS AND RELATED PURPOSES.

20. How would you describe yourself?

1 Black, not of Hispanic origin
2 Asian (Oriental) or Pacific Islander
3 Hispanic
4 White, not of Hispanic origin
5 Alaskan Native or American Indian

21. What is your sex? 1 Male 2 Female

EXHIBIT 5

POSTGRADUATION STUDY

MAJOR FIELD CLASSIFICATION

## DEGREES AND AWARDS BASED ON LESS THAN 4 YEARS

MODIFIED HEGIS CODE	CATEGORY (HEGIS CODE)
	(BUSINESS AND COMMERCE TECHNOLOGIES - 5000s)
500100	BUSINESS AND COMMERCE TECHNOLOGIES (5001)
500200	ACCOUNTING TECHNOLOGIES (5002)
500400	MARKETING, DISTRIBUTION, PURCHASING, BUSINESS, AND INDUSTRIAL MANAGEMENT TECHNOLOGIES (5004)
500500	SECRETARIAL TECHNOLOGIES (5005)
500800	COMMUNICATION AND BROADCASTING TECHNOLOGIES (5008)
501200	APPLIED ARTS, GRAPHIC ARTS, AND FINE ARTS TECHNOLOGIES (5012)
509999	OTHER BUSINESS AND COMMERCE TECHNOLOGIES (5099 ONLY)
	(DATA PROCESSING TECHNOLOGIES - 5100s)
510100	DATA PROCESSING TECHNOLOGIES, GENERAL
	(HEALTH SERVICES AND PARAMEDICAL TECHNOLOGIES - 5200s)
520200	DENTAL ASSISTANT TECHNOLOGIES (5202)
520300	DENTAL HYGIENE TECHNOLOGIES (5203)
520400	DENTAL LABORATORY TECHNOLOGIES (5204)
520500	MEDICAL LABORATORY TECHNOLOGIES (5205)
520700	RADIOLOGIC TECHNOLOGIES (5207)
520600	Animal Laboratory Assistants
520800	NURSING, R.N. (LESS THAN 4 YEAR PROGRAM)
520900	Nursing, Practical
521000	OCCUPATIONAL THERAPY TECHNOLOGIES (5210)
521300	Medical Records Technologies
521400	MEDICAL ASSISTANT AND MEDICAL OFFICE ASSISTANT TECHNOLOGIES (5214)
521500	RESPIRATORY THERAPY TECHNOLOGIES (5215)
521500	Institutional Management Technologies
521900	PHYSICAL THERAPY TECHNOLOGIES (5219)
529901	CYTOTECHNOLOGY (NO HEGIS CODE)
529902	DIETETIC TECHNOLOGIES (NO HEGIS CODE)
529903	EMERGENCY MEDICAL SERVICES TECHNOLOGIES (NO HEGIS CODE)

MODIFIED HEGIS CODE	CATEGORY (HEGIS CODE)
	(MECHANICAL AND ENGINEERING TECHNOLOGIES - 5300s)
530400	ARCHITECHTURAL DRAFTING TECHNOLOGIES (5304)
530500	CHEMICAL TECHNOLOGIES (5305)
530900	CIVIL TECHNOLOGIES (5309)
531000	ELECTRONICS AND MACHINE TECHNOLOGIES (5310)
531100	ELECTROMECHANICAL TECHNOLOGIES (5311)
531200	INDUSTRIAL TECHNOLOGIES (5312)
531500	MECHANICAL TECHNOLOGIES (5315)
	(NATURAL SCIENCE TECHNOLOGIES - 5400s)
540200	AGRICULTURE TECHNOLOGIES (5402)
	(PUBLIC SERVICE RELATED TECHNOLOGIES - 5500s)
550400	LIBRARY ASSISTANT TECHNOLOGIES (5504)
550500	POLICE, LAW ENFORCEMENT, CORRECTIONS TECHNOLOGIES (5505)
550600	RECREATION AND SOCIAL WORK RELATED TECHNOLOGIES (5506)*
550700	FIRE CONTROL TECHNOLOGY (5507)
560000	ARTS AND SCIENCE OR GENERAL PROGRAMS, NOT ORGANIZED AS OCCUPATIONAL CURRICULUMS (5600)**

---

* Includes "Recreation and Rehabilitation Technologies" per discussion with Patti Vasilenko.

**See attached definition from NCES Form 2300-2.1, 3/77.

Category names and HEGIS codes from NCES Form 2300-2.1, 3/77 and OE Form 2300-2.1, 3/76.

XXXX0n = new subcategory of HEGIS "other, spcify" four-digit code.

EXHIBIT 6

POSTGRADUATION STUDY

MAJOR FIELD CLASSIFICATION

Bachelor's, Master's, Doctoral and First-Professional Degrees

Notes:

Category names and HEGIS codes from NCES Form 2300-2.1, 3/77 and OE Form 2300-2.1, 3/76.

XXXX99 = category comprised of two or more HEGIS codes.

XX9999 = "all others", not elsewhere classifiable.

XXXX0n = HEGIS XXXX-n or new subcategory of HEGIS "other, specify" four-digit code.

MODIFIED HEGIS CODE	CATEGORY (HEGIS CODE)
010000	AGRICULTURE AND NATURAL RESOURCES (0100)
020000	ARCHITECTURE AND ENVIRONMENTAL DESIGN (0200)
030000	AREA STUDIES (0300)
040000	BIOLOGICAL SCIENCES (0400)
	(BUSINESS AND MANAGEMENT - 0500s)
050100	BUSINESS AND COMMERCE, GENERAL (0501)
050200	ACCOUNTING (0502)
050400	BANKING AND FINANCE (0504)
050600	BUSINESS MANAGEMENT AND ADMINISTRATION (0506)
050900	MARKETING AND PURCHASING (0509)
051600	LABOR AND INDUSTRIAL RELATIONS (0516)
051700	BUSINESS ECONOMICS (0517)
059999	OTHER BUSINESS FIELDS (0503, 0505, 0507, 0508, 0510, 0511, 0512, 0513, 0514, 0515, 0599)
060000	COMMUNICATIONS (0600)
070000	COMPUTER AND INFORMATION SCIENCES (0700)
	(EDUCATION - 0800s)
080200	ELEMENTARY EDUCATION, GENERAL (0802)
080899	SPECIAL EDUCATION FIELDS (0808-0820 & 0899-2)
082300	PRE-ELEMENTARY EDUCATION (KINDERGARTEN) (0823)
082799	EDUCATIONAL ADMINISTRATION AND SUPERVISION (0827 & 08[illegible]8)
083500	PHYSICAL EDUCATION (0835)
083700	HEALTH EDUCATION (INCLUDE FAMILY LIFE EDUCATION) (0837)
083800	BUSINESS, COMMERCE, AND DISTRIBUTIVE EDUCATION (0838)
083900	INDUSTRIAL ARTS, VOCATIONAL, AND TECHNICAL EDUCATION (0839)
089904	NURSING EDUCATION (TRAINING OF SCHOOL NURSES AND OF TEACHERS OF NURSING) (0899-4)

MODIFIED HEGIS CODE	CATEGORY (HEGIS CODE)
089999	OTHER EDUCATION FIELDS (0801, 0803-0807, 0821, 0822, 0824-0826, 0829-0834, 0836, 0899-1, 0899-3, 0899-9)
	(ENGINEERING - 0900s)
090200	AEROSPACE, AERONAUTICAL AND ASTRONAUTICAL ENGINEERING (0902)
090699	CHEMICAL AND PETROLEUM ENGINEERING (0906 & 0907)
090800	CIVIL, CONSTRUCTION, AND TRANSPORTATION ENGINEERING (0908)
090900	ELECTRICAL, ELECTRONICS, AND COMMUNICATIONS ENGINEERING (0909)
091000	MECHANICAL ENGINEERING (0910)
091300	INDUSTRIAL AND MANAGEMENT ENGINEERING (0913)
092500	ENGINEERING TECHNOLOGIES (BACCALAUREATE AND HIGHER PROGRAMS) (0925)
099999	OTHER ENGINEERING FIELDS (0901, 0903-0905, 0911, 0912, 0914-0924, 0999)
100000	FINE AND APPLIED ARTS (1000)
110000	FOREIGN LANGUAGES (1100)
	(HEALTH PROFESSIONS - 1200s)
120100	HEALTH PROFESSIONS, GENERAL (1201)
120200	HOSPITAL AND HEALTH CARE ADMINISTRATION (1202)
120300	NURSING (BACCALAUREATE AND HIGHER PROGRAMS) (1203)
120400	DENTISTRY, D.D.S. or D.M.D. DEGREE (1204)
120500	DENTAL SPECIALTIES (WORK BEYOND FIRST-PROFESSIONAL DEGREE, D.D.S. or D.M.D.) (1205)
120600	MEDICINE, M.D. DEGREE (1206)
120700	MEDICAL SPECIALTIES (WORK BEYOND FIRST-PROFESSIONAL DEGREE, M.D.) (1207)
120800	OCCUPATIONAL THERAPY (1208)
121000	OSTEOPATHIC MEDICINE, D.O. DEGREE (1210)
121101	PHARMACY, D. PHAR. DEGREE (1211-1)

MODIFIED HEGIS CODE	CATEGORY (HEGIS CODE)
121102	PHARMACY (ALL EXCEPT D. PHAR.) (1211-2)
121200	PHYSICAL THERAPY (1212)
121300	DENTAL HYGIENE (BACCALAUREATE AND HIGHER PROGRAMS) (1213)
121400	PUBLIC HEALTH (1214)
121700	BIOMEDICAL COMMUNICATION (1217)
122000	SPEECH PATHOLOGY AND AUDIOLOGY (1220)
122200	CLINICAL SOCIAL WORK (MEDICAL AND PSYCHIATRIC AND SPECIALIZED REHABILITATION SERVICES) (1222)
122300	MEDICAL LABORATORY TECHNOLOGIES (BACCALAUREATE AND HIGHER PROGRAMS) (1223)
122500	RADIOLOGIC TECHNOLOGIES (BACCALAUREATE AND HIGHER PROGRAMS) (1225)
129901	PHYSICIAN ASSISTANTS (NO HEGIS CODE)
129902	NURSE PRACTITIONERS, MIDWIFERY (NO HEGIS CODE)
129903	NURSE PRACTITIONERS, FAMILY PLANNING (NO HEGIS CODE)
129904	NURSE PRACTITIONERS, PEDIATRICS (NO HEGIS CODE)
129905	NURSE PRACTITIONERS, SCHOOL (NO HEGIS CODE)
129906	NURSE PRACTITIONERS, OTHER (NO HEGIS CODE)
129999	OTHER HEALTH PROFESSIONS (1299)
130000	HOME ECONOMICS (1300)
	(LAW - 1400s)
140101	LAW, GENERAL (LL.B. or J.D. DEGREE) (1401-1)
149999	OTHER LAW (1401-2 & 1499)

MODIFIED HEGIS CODE	CATEGORY (HEGIS CODE)
	(LETTERS - 1500s)
150199	ENGLISH AND ENGLISH LITERATURE (1501 & 1502)
159999	OTHER LETTERS (1503-1510, 1599)
160000	LIBRARY SCIENCE (1600)
170000	MATHEMATICS (1700)
180000	MILITARY SCIENCES (1800)
190000	PHYSICAL SCIENCES (1900)
200000	PSYCHOLOGY (2000)
210000	PUBLIC AFFAIRS AND SERVICES (2100)
	(SOCIAL SCIENCES - 2200s)
220400	ECONOMICS (2204)
220500	HISTORY (2205)
220700	POLITICAL SCIENCE AND GOVERNMENT (2207)
220800	SOCIOLOGY (2208)
229999	OTHER SOCIAL SCIENCES (2201-2203, 2206, 2209-2215, 2299)
	(THEOLOGY - 2300s)
230101	THEOLOGICAL PROFESSIONS, GENERAL (B.D., M. DIV.,RABBI or OTHER FIRST-PROFESSIONAL DEGREE) (2301-1)
239999	OTHER THEOLOGY (2301-2, 2302-2304, 2399)
	(INTERDISCIPLINARY STUDIES - 4900s)
490100	GENERAL LIBERAL ARTS AND SCIENCES (4901)
490200	BIOLOGICAL AND PHYSICAL SCIENCES (4902)
490300	HUMANITIES AND SOCIAL SCIENCES (4903)
490400	ENGINEERING AND OTHER DISCIPLINES (4904)
499999	OTHER INTERDISCIPLINARY STUDIES (4999)

EXHIBIT 7

DRAFT

State of New Jersey
DEPARTMENT OF HIGHER EDUCATION
225 WEST STATE STREET
P. O. BOX 1293
TRENTON, NEW JERSEY 08625

MEMORANDUM

February 8, 1978

TO: Institutional Representatives to Postgraduation Study, "Alternative I" Community Colleges

FROM: Denise Thum DT
Assistant Director, Office of Planning and Research

SUBJECT: Attached questionnaire: "Postgraduation Study: Employment Status of 1976 Graduates of Community College Occupational Programs"

Your institution is one of the thirteen "Alternative I" community colleges that agreed to furnish basic data to the Postgraduation Study from an institutional survey of 1976 graduates.

The attached questionnaire requests information about your institution's follow-up survey. At this time, we would like to obtain data on the employment of occupational program graduates; requests for additional information may be made in the future.

Will you please complete the questionnaire or direct it to the appropriate respondent at your institution? The questionnaire should be returned to me by March 1, 1978.

Thank you for your cooperation.

Attachment

DRAFT

POSTGRADUATION STUDY: EMPLOYMENT STATUS OF 1976 GRADUATES OF COMMUNITY COLLEGE OCCUPATIONAL PROGRAMS

Institution ______________________________

Institutional representative to Postgraduation Study:

Name ______________________________

Title ______________________ Phone ______________

Please indicate person completing questionnaire:

Name ______________________________

Title ______________________ Phone ______________

Please return your completed questionnaire to the address below by March 1, 1978.

Denise Thum
Assistant Director
Office of Planning and Research
Department of Higher Education
225 West State Street
Trenton, New Jersey 08625

Inquiries about the Postgraduation Study should be directed to Denise Thum (609) 292-4057.

1. Has your institution conducted a follow-up survey of its 1976 graduates?

☐ Yes ☐ No

IF YES, PLEASE ANSWER THE FOLLOWING QUESTIONS ABOUT THE SURVEY. IF MORE THAN ONE SURVEY HAS BEEN DONE OF 1976 GRADUATES, PLEASE PROVIDE INFORMATION ABOUT THE MOST RECENT SURVEY.

2. When was the data collection period?

Start date: ____________________ (month) ________ (year)

Completion date: ____________________ (month) ________ (year)

3. What was the response rate? (number of 1976 graduates who completed the questionnaire divided by total number of 1976 graduates in the study sample or population)

Response rate = __________%

4. Did the survey obtain information on graduates' employment status at the time of the survey?

☐ Yes ☐ No

5. IF YES: Have the data been analyzed to determine the employment status of the graduates of each degree program (major field of study)? Check one.

- ☐ Yes
- ☐ No, but plan to analyze employment status by degree program
- ☐ No, but would be able to analyze employment status by degree program
- ☐ No - unable to analyze employment status by degree program

IF YES TO QUESTION 5, PLEASE CONTINUE.

6. INSTRUCTIONS: For purposes of this survey, an ORGANIZED OCCUPATIONAL DEGREE PROGRAM is one which meets all three of the following criteria:

A. The curriculum is a series of required and elective courses constituting an integrated program designed to prepare students for IMMEDIATE employment in a SPECIFIC occupation or cluster of occupations.

B. The program leads to an ASSOCIATE degree.

C. The program is NOT designed primarily to prepare students for CONTINUATION in a program leading to a bachelor's degree or other formal recognition beyond the associate degree.

PLEASE LIST BELOW ALL ORGANIZED OCCUPATIONAL DEGREE PROGRAMS AT YOUR INSTITUTION, AND PROVIDE THE REQUESTED DATA FROM YOUR MOST RECENT SURVEY OF 1976 ASSOCIATE DEGREE GRADUATES.

Name of Occupational Degree Program	% of Total Respondents Employed Full-Time at Time of Survey	% of Total Respondents Employed Full-Time in Field of Preparation	% of Total Respondents Unemployed and Seeking Employment

6. (CONTINUED)

Name of Occupational Degree Program	% of Total Respondents Employed Full-Time at Time of Survey	% of Total Respondents Employed Full-Time in Field of Preparation	% of Total Respondents Unemployed and Seeking Employment

1

6. (CONTINUED)

Name of Occupational Degree Program	% of Total Respondents Employed Full-Time at Time of Survey	% of Total Respondents Employed Full-Time in Field of Preparation	% of Total Respondents Unemployed and Seeking Employment

Appendix IV

Documentation of Projections of Supply and Demand for Health Professions in New Jersey

HEALTH MANPOWER PLANNING SERIES

REPORT NUMBER THREE

An Analysis of the Need for Health Professionals in New Jersey 1975-1985

NEW JERSEY STATE DEPARTMENT OF HIGHER EDUCATION

JUNE 1978

State of New Jersey
DEPARTMENT OF HIGHER EDUCATION
225 WEST STATE STREET
P. O. BOX 1293
TRENTON, NEW JERSEY 08625

MEMORANDUM

June 19, 1978

TO: Recipients of the New Jersey Department of Higher Education's Health Manpower Planning Series

FROM: Edward Cohen, Assistant Chancellor, Health Professions Education

This report, "An Analysis of the Need for Health Professionals in New Jersey 1975-1985," is the third in a series of health manpower planning reports released by the Department of Higher Education. This series has been developed in support of the Health Professions Education Master Plan.

This document provides updated manpower information on twenty-eight health professions, including physicians; dentists; dental auxiliaries; nurses; nurse practitioners; optometrists; pharmacists; physician's assistants; veterinarians; radiologic personnel; medical records personnel; occupational, physical, respiratory, and speech therapists; and, dietitians and nutritionists. All seventeen health professions which were first quantitatively addressed in the Master Plan are again studied in this report. Also, eleven professions are newly analyzed. For each profession, the statewide data provided include 1975 and projected 1980 and 1985 supply, as well as their projected 1980 and 1985 demand. The sources of data and quantitative models used to develop this analysis are fully documented in this report.

The projections provided in this analysis are based on the most accurate information currently available on New Jersey's health professionals. These projections update and, therefore, supersede both the projections provided in the Master Plan and other manpower studies released since its publication in 1973. Accordingly, this information should be used in all subsequent health professions program development and planning activities.

PREFACE

This analysis and its publication were supported by funds received through DHEW contract #231-76-0015, awarded by the Health Resources Administration.

Office for Health Manpower
New Jersey Department of Higher Education
Trenton, New Jersey

June, 1978

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I. INTRODUCTION

In May, 1973, the New Jersey Department of Higher Education (DHE) released the Health Professions Education Master Plan (HPEMP). This plan was developed over a period of two years in response to the need for a coordinated network of educational programs to meet the State's future needs for health professionals.

The development of the Master Plan involved those groups which would ultimately be affected by its implementation: post-secondary institutions preparing health professionals; professional and licensing organizations in the health professions; employers of health personnel, and; the general public receiving health services from graduates of the programs involved. In order to create a workable educational plan, it was necessary to focus on only a portion of the more than 125 separate occupations which make up the health professions field. Twenty-five priority occupations were chosen as a starting point. Of these, seventeen occupations were studied in detail in terms of current supply, projected supply, demand and manpower needs, existing training programs, and emerging trends in patterns of educational and career mobility.

When it was developed, the Master Plan was envisioned as a "rolling" plan which would be refined and revised on a periodic basis. Since its approval in 1973, interim changes in its health manpower projections based on newly available data were made for several professions, specifically physicians, nurses, dentists, veterinarians and physical therapists. Furthermore, the Health Professions Education Advisory Council recently reviewed and updated the policy recommendations contained in the original document. In addition to these revisions, Department staff has worked to develop up-to-date projections of supply and demand to supersede those provided in the original plan, as well as all interim projections made since the release of the Master Plan. With the integration of these projections and the amended recommendations, full revision of the Master Plan will be completed.

This report provides projections of New Jersey's future supply and demand for twenty-eight health professions. Seventeen of these professions were quantitatively addressed in the 1973 Master Plan. These professions are:

physicians
dentists
dental hygienists
dental laboratory technicians
professional nurses
pharmacists
veterinarians
dietitians
cytotechnologists
medical technologists
medical records administrators
medical records technicians
radiologic technicians
occupational therapists
physical therapists
respiratory therapists
speech pathologists/audiologists

The remaining eleven professions discussed in this report are:

dental assistants
optometrists
nurse practitioners (NPs)
physician's assistants (PAs)
nutritionists
histologic technicians
medical laboratory technicians
medical laboratory assistants
nuclear medicine technologists
occupational therapy assistants
respiratory therapy technicians

The specific data provided for each profession include 1975 supply; 1980 and 1985 projected supply based on educational output, in-state retention and labor force attrition; and, 1980 and 1985 projected demand. Where possible, and noted, data are provided in full-time equivalents (FTE), where 1 FTE = 1 full-time professional = 2 part-time professionals. To determine future demand, four models are used. The first model, which concerns licensed professions, is based on the relationship between the distribution of a given profession and characteristics of county populations, such as income, age, and size. A second model is used for dental auxiliaries which relates demand for these professions to the future supply of dentists. The third model developed for many institutionally employed non-licensed health professions relates the demand for their services to institutional parameters such as length of stay, non payroll expense, inpatient visits, emergency and outpatient visits, and wages. Finally, a theoretical model estimating the potential need for physician's assistants and nurse practitioners in the delivery of primary care is included. Each of these models is documented in Section II of this report.

The report also provides strategy lines for each profession which demonstrate the relationship between projected supply and demand through 1985. In those cases when supply exceeds demand, a projected surplus of professionals is anticipated. This means that the output of graduates from New Jersey programs, coupled with in-state migration, is more than sufficient to meet future manpower needs. In cases when demand exceeds supply, a shortage of professionals is projected. The results of the supply and demand projections for 1985 are shown in the summary Table on the following page.

SUMMARY TABLE

1985 Projection Results for Health Professionals

Profession	1985 Supply	1985 Demand	Manpower Need	
			Number	Per Cent*
Physicians - without P.L. 94-484	16,040	16,300	-260	-1.6
- with P.L. 94-484	14,400	16,300	-1900	-13.2
Dentists	5,800	5,980	-180	-3.1
Dentists Assistants - NJ Ratio	6,040	5,490	+550	9.1
- US Ratio	6,040	6,380	-340	-5.6
Dental Hygienists - NJ Ratio	1,090	1,050	+40	3.7
- US Ratio	1,090	1,220	-130	-11.9
Dental Lab Technicians	1,650	1,790	-140	-8.5
Nurses - Continuing Caps	56,200	54,800	+1,400	2.5
- Ending Caps	56,500	54,800	+1,700	3.0
Nurse Practitioners-Theoretical	319	908	-589	-
Physicians Assistants-Theoretical	230	759	-529	-
Optometrists	862	972	-110	-12.8
Pharmacists - without P.L. 94-484	4,632	5,110	-480	-10.4
- with P.L. 94-484	4,632	4,580	+50	1.1
Veterinarians	947	1,040	-93	-9.8
Dietitians	747	756	-9	-1.2
Nutritionists	63	67	-4	-6.3
Cytotechnologists	152	171	-19	-12.5
Histologic Technicians	132	155	-23	-17.4
Medical Technologists	1,430	1,460	-30	-2.1
Medical Lab Technicians	1,600	1,450	+150	10.5
Medical Lab Assistants	470	553	-83	-17.7
Medical Records Administrators	142	161	-19	-13.4
Medical Records Technicians	211	159	+52	24.6
Radiologic Technicians	6,970	5,960	+1,010	14.5
Nuclear Medicine Technologists	263	212	+51	19.4
Occupational Therapists	378	427	-49	-13.0
Occupational Therapy Assistants	283	306	-23	-8.1
Physical Therapists	1,180	1,310	-130	-11.0
Respiratory Therapists	235	143	+92	14.0
Speech Pathologists/Audiologists	1,030	975	+55	5.4

*Manpower need percentage is based on the total 1985 projected supply. In cases where percentages are positive, a surplus is projected, while a negative percentage indicates a manpower shortage.

While the shortages indicated in the summary table may point to the need for increasing enrollments, developing new programs, and/or promoting service delivery by alternative professionals (i.e., physician extenders), this report does not provide specific policy recommendations for each profession, as these will be developed during the Department's ongoing planning process. However, it is intended that these projections will be one of the major elements upon which such health professions education policy recommendations will be based. Moreover, these data will be used in future program review activities for health professions education programs.

II. EXPLANATION OF PROJECTION MODELS

Prior to examining the data and methods used in this report, it should be realized that projecting the supply and demand for any health occupation is not an exact science. Manpower forecasting models, like other statistical measures and estimates, attempt to provide answers to particular questions. There are, therefore, many varieties of forecasts obtainable by many techniques. To the extent that all models are based on a number of assumptions either as to the stability of the relationships of the variables that make up the model, or as to the way in which the variables are expected to change in the future, it is not surprising to find that different models yield different projections. This does not imply that projections should not be used, but it does suggest that before the projections are accepted, the assumptions of the model should be fully stated.

While it is obvious that we are suggesting that one should use manpower projection models with caution, these models do provide the decision maker with a useful tool to assist in the development of policy. Modeling and forecasting provide a logical and rigorous means for gaining insight into the future and offer the policy maker an opportunity to explore the implications of policy before it is put into effect.

In this section, the data sources, model assumptions and projection techniques for each profession are fully documented. All baseline data used in developing the models are for 1975 unless otherwise noted. Using these data, four major projection models were developed, one for licensed professions, a second for dental auxiliaries, a third for non-licensed professions, and a theoretical model for nurse practitioners (NPs) and physician's assistants (PAs).

A. Baseline Data

1. Current Supply Data

Three sources of data are used to determine full-time equivalent supply in the base year, 1975. These include the Department of Higher Education's (DHE) Health Manpower Information System(1), the Manpower Component of the Department of Health's Health Data Services Unit(2), and the Department of Labor and Industry's Bureau of Occupational Information.(3)

The Department of Higher Education's data system houses information from licensed health professions surveys undertaken until 1975, as well as information from an employment survey of the major health employment settings completed in late 1974. It also includes the results of surveys of nurse practitioners, physician's assistants and primary care physicians undertaken to develop the NP/PA model. The information included in the system is used to estimate the New Jersey supply of active physical therapists, nurses, and dental hygienists, since no data are available from subsequent surveys of these professions. Also, counts of many of the non-licensed health professions are taken from the DHE system. These professions include nuclear medicine technologists, occupational therapists and assistants, respiratory therapists and technicians, medical technologists, medical laboratory technicians and assistants, cytotechnologists, histologic technicians, dietitians and nutritionists, and medical records personnel. The Department of Health's 1975 data from licensed health professional surveys are used to estimate the 1975 supply of physicians, dentists, optometrists, and veterinarians. The Department of Labor and Industry's Occupation Employment Survey results are used to estimate the total number of dental assistants and dental laboratory technicians working in New Jersey. These data were also used to complement the DHE employment survey results for laboratory personnel, since medical and dental laboratories were not included in the DHE survey.

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(1) This system is described in the Department's publication, Development of a Uniform Data Base for State and Local Health Manpower Planning, Monograph #2, by L. Dars and J. Tomson, New Jersey Department of Higher Education, Trenton, 1974.

(2) Data reports documenting the supply of licensed health professionals in New Jersey have been released by the Department of Health in its Health Manpower Information Series since 1976.

(3) Triennially, the New Jersey Department of Labor and Industry conducts U.S. Department of Labor Occupational Employment Surveys of all health employment settings except hospitals.

In order to verify the estimates of health professional supply provided in this report, a number of alternative sources have been consulted. These include the New Jersey licensing boards, the state professional associations,and the national associations of certified or registered health professionals. In certain cases, this information has been used to supplement the data collected through surveys. For instance, it has become evident that the New Jersey Board of Pharmacy has data which are more complete than those available from the DHE manpower survey, due to response problems with that survey. Therefore, these data supercede our survey results. A similar situation exists for radiologic technicians, therefore the Board of X-Ray Technicians Examiners distributional data are used to develop the projection model. Also, the 1975 supply count used for registered occupational therapists has been reviewed by the New Jersey Occupational Therapy Association. Similar reviews of the 1975 supply data were accorded to other state associations and societies for both the licensed and non-licensed health professions.

2. Supply Projection Data

In projecting the future supply of health professionals from the base year, a number of quantitative factors are needed. First, head counts of health professionals are translated into full-time equivalents (FTE's) for those professions where full-time and part-time data are available. The full-time equivalent calculation is made by applying the percentages of full-time and part-time professionals to base year head count.(4) FTE calculations are also applied to future additions to the workforce due to educational output and in-state migration. For the licensed health professions, educational output and in-state migration are reflected in the number of professionals newly licensed in the State. This information is provided by the various licensing boards, as shown below:

Profession	Licensing Board
Physician (M.D. & D.O.) Physical Therapist	Board of Medical Examiners
Dentist	Board of Dentistry
Nurse	Board of Nursing
Pharmacist	Board of Pharmacy
Optometrists	Board of Optometrists
Veterinarians	Board of Veterinary Medical Examiners
X-Ray Technicians	Board of X-Ray Technicians Examiners

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(4) One full-time equivalent equals one full-time professional or two part-time professionals.

For the remaining professions analyzed in this report, educational output data are taken from the DHE report entitled An Inventory of Health Professions Education Programs in New Jersey.(5) This report documents the third inventory of health professions programs released by DHE. Among the data it provides are counts of program enrollments and graduates for all post-secondary health related educational programs. In projecting future supply, graduate output data are adjusted for in-state retention of graduates. The rate of "in-state survival" for each professional group can be found in the Master Plan.(6) After adjustment, these gross increases in supply are translated into full-time equivalents. In addition to using graduate output to determine future supply growth for non-licensed professions, national registries of the certified professions are also consulted to determine historical levels of in-state migration of professionals. Finally, normal attrition due to death and retirement is used in the projection of manpower supply. Projected attrition rates for health professions are found in the United States Department of Labor, Bureau of Labor Statistics publication, Tomorrow's Manpower Needs.(7)

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(5) New Jersey Department of Higher Education, An Inventory of Health Professions Education Programs in New Jersey, Health Manpower Planning Series Report Number Two, Trenton, New Jersey, January 1978.

(6) New Jersey Department of Higher Education, Health Professions Education Master Plan, Trenton, New Jersey, May 1973, p. 91.

(7) U.S. Department of Labor, Bureau of Labor Statistics, Tommorow's Manpower Needs, Supplement #4, Estimating Occupational Separations from the Labor Force for States, USGPO, Washington, 1974.

3. Demand Projection Data

To develop the projections of demand for health professions in New Jersey, several data sources are used. For licensed professions, demand is related to a number of variables, including population size, income, median age, levels of hospital utilization, percent aged (percent 65 years and older), and school enrollments. Current population and projections of future population and percent aged are compiled from official state publications prepared by the N.J. Department of Labor and Industry.(8)

The data on median age by county are taken from the U.S. Census. Permanent income is used in place of current income as an independent variable in the regression equation.(9) A data series on per capita disposable income by county from 1954-1974 is taken from the publication Sales Management.(10) This income series is weighted and an estimate of 1975 permanent income is calculated. (An explanation of the procedure used to calculate permanent income can be found in Appendix A.) To determine growth trends in income, information on real per capita income is obtained from the New Jersey Department of Labor and Industry and from data prepared by the United States Department of Commerce.(11) Both agencies have calculated that over the next ten years the average rate of growth in real earnings will be approximately 2% per year.

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(8) New Jersey Department of Labor and Industry, Population Estimates for New Jersey, 1975; New Jersey Population Projections 1980-2020 (Series II Projections used); Provisional County Projections in New Jersey by Age, Sex and Race 1985, Working Paper Number 1, November 1975.

(9) Permanent income is the annual flow of earnings generated by the consumer's human wealth (education, health) and non-human wealth (physical assets). This variable provides a stable measure of long-run consumer buying power.

(10) Sales Management Inc., Sales Management, Sales Marketing Management, New York, various issues.

(11) United States Department of Commerce, Area Projections, 1990, USGPO, Washington, 1974, p. 221.

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Data on 1975 hospital visits by county are taken from the annual study prepared by the New Jersey Department of Health.(12) Annual data on visits in New Jersey indicate an increase of approximately 13% from 1972 to 1976 (3.25% per year). National data also indicate a 3% annual increase in visits and this rate is used in the projection model.(13) Data on school enrollments are provided by the New Jersey Department of Education and indicate a decline in total enrollments through 1985.(14) Data used to determine the potential demand for nurse practitioners and physician's assistants were developed from a survey of New Jersey primary care physicians undertaken in 1975.(15)

For the majority of non-licensed professions, the calculation of demand is based on the institutional demand for their services. To develop these projection equations, data from the New Jersey Department of Health's S.H.A.R.E. system and the American Hospital Association are used.(16) After the institutional demand equations are developed, AHA data are used to calculate growth rates for independent variables which include inpatient and emergency visits, outpatient clinic visits, average length of stay, inpatient days, non-payroll expense per bed, inpatient beds, and average wages.(17)

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(12) New Jersey Department of Health, 1976-1977 New Jersey State Medical Facilities Plan, Trenton, 1977.

(13) Health Insurance Institute, Source Book of Health Insurance Data, 1974-1975, New York, 1975, p. 59.

(14) New Jersey Department of Education, Projected Enrollments in New Jersey Public School Districts, Trenton, 1977.

(15) New Jersey Department of Higher Education, "A Study of the Potential Need for Nurse Practitioners and Physician's Assistants in New Jersey," Trenton, 1977.

(16) New Jersey Department of Health, Standard Hospital Accounting and Rate Evaluation, Trenton, 1975. American Hospital Association, The 1976 American Hospital Association Guide to Health Care Field, Chicago, Illinois, 1976.

Once the values of each of the independent variables in the regression model are projected for 1980 and 1985, three other data elements are used in adjusting the calculation of demand for both licensed and non-licensed health professions, with the exception of nurse practitioners and physician's assistants. The first adjustment incorporates a measure of current unmet need for each profession. This measure fluctuates between 3% (dentists) and 9% (laboratory personnel), usually averaging 5%. The sources used to calculate unmet need include past DHEW reports, federal manpower shortage area criteria, and past DHE health manpower reports.(18) Institutional unmet need is used as an index of overall unmet need in both institutional and private practice settings, and it is calculated as a single increase over the entire 10 year projection period. A second factor which will influence the demand for health professionals is the enactment of national health insurance (NHI). The methodology used to estimate the significance of this variable is discussed in the Health Professions Education Master Plan.(19) For the purpose of these projections, the impact of NHI is calculated as the average of the potential effects of a past administration bill and of the Kennedy bill, or 5.7%. For insurance effects on the demand for dentists, a rate of 4% is used.(20) Both these increases are projected to occur over the 1980-1985 projection period. The final adjustment to demand involves increases in productivity. In these projections, annual productivity increases range from 1% (non-licensed personnel) to 2.5% (pharmacists), with a 1.5% increase for physicians and 1.6% for dentists.(21) While these productivity gains are assumed to be stable over the projection period, they can be affected by changes in technology and service delivery patterns, including the increased use of aides and extenders.

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(17) American Hospital Association, Hospital Statistics, 1973, Chicago, 1973, p. 117, and subsequent annual reports, 1974, 1975, 1976, 1977.

(18) The sources used for the projections in this document are DHEW's Health Manpower in Hospitals, 1970; DHEW health manpower shortage area criteria, draft regulations Federal Register; DHE's An Update of the Analysis of the Need for Dentists (10/75); DHE's Employment of Non-licensed Health Professionals in New Jersey (12/75); DHE's An Analysis of the Need for Physicians in New Jersey 1975-1985 (12/77).

(19) New Jersey Department of Higher Education, Health Professions Education Master Plan, Trenton, 1973, Appendix E, p. 232-258.

B. Licensed Health Professions Model

The first demand model used in these projections is the licensed health professions model. This model is based on a single regression equation which relates professional distribution by county to a number of independent variables such as permanent income, median age, population size, hospital service utilization, school enrollments, and percent aged.

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(20) Robert Nathan Associates, Assessment and Evaluation of the Impact of Archetypal National Insurance Plans on U.S. Health Manpower Requirements, prepared for DHEW National Institute of Health, Washington, 1973, pp. 71-74.

(21) Sources for productivity measures are Herbert Klarman "Economic Aspects of Projecting Health Manpower Requirements" Journal of Human Resources Summer 1969; the American Medical Association, Socioeconomic Issues of Health, Chicago, 1973, p. 61; Paul Feldstein, Financing Dental Care: An Economic Analysis, D.C. Heath Company, Lexington, Mass., 1973, p. 82; New Jersey Department of Law and Public Safety, Board of Pharmacists, Annual Reports, 1972-1976, Newark.

Nine unique equations are used to project the demand for twelve professions. The table below displays the variables used for these equations:

Profession	Dependent Variable	Independent Variables
Physicians	Physicians per 100,000 population	Permanent Income, Median Age, Hospital Visits
Dentists	Dentists per 100,000 population	Permanent Income, Median Age, Hospital Visits
Nurses	Number of Nurses	Population, Permanent Income, Aged, Hospital Visits
Optometrists	Number of Optometrists	Population, Hospital Visits*
Pharmacists	Number of Pharmacists	Physicians (per county)
Physical Therapists (Occupational Therapists & Assistants)	Physical Therapists per 100,000 population	Permanent Income, Aged, Hospital Visits
Speech Pathologists & Audiologists	Number of Speech Pathologists & Audiologists	School Enrollments, Permanent Income
Veterinarians	Number of Veterinarians	Population, Permanent Income
X-Ray Technicians (Nuclear Medicine Technologists)	Number of X-Ray Technicians	Population, Permanent Income, Aged

Each of these equations was developed using stepwise regression techniques. The following narrative explains the statistical basis for the physician demand projection equation used in this report. The basis of this equation is identical to that of the other eight equations. However, the variables used and their coefficients vary.

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*See Appendix B for explanation of the variables used in this model.

The demand projection model used for physicians is defined by the following basic equation:

(1) $\left(\frac{P}{Pop}\right)_b = A \cdot Y_b^{B1} \cdot A_b^{B2} \cdot V_{hb}^{B3} \cdot E$ where:

$\left(\frac{P}{Pop}\right)$ = The physician to population ratio.

A = Constant term of the equation.

Y_b = Permanent family income by county in the base year. (See Appendix A for description.)

A_b = Median average age by county for the base year population.

V_{hb} = Hospital visits by county for the base year population.

B_1 = Income elasticity coefficient.

B_2 = Age elasticity coefficient.

B_3 = Hospital visit elasticity coefficient.

E = A random error term representing all other variables that are likely to affect the demand for physicians but are excluded from the equation. By assumption, the average effect of all the excluded variables is zero.

This equation can be fitted to determine the unknown coefficients (B_1, B_2, etc.) by regression analysis once it has been transformed from an exponential relationship to a linear form, which is accomplished by taking the logarithms of both sides of the equation. This yields:

(2) $\ln \left(\frac{P}{Pop}\right)_b = \ln A + B_1 \ln Y_b + B_2 \ln A_b + B_3 \ln V_{hb} + \ln E.$

From the mathematical definition of a linear equation, the coefficients B_1, B_2 etc. represent estimates of the slope of the regression line. For example:

$$B_1 = \frac{\Delta \ln \left(\frac{P}{Pop}\right)_b}{\Delta \ln Y_b}$$

The change in the logarithm of a number is equal to its percentage change, therefore:

$$B_1 = \frac{\% \Delta \left(\frac{P}{Pop}\right)_b}{\% \Delta Y_b}$$

This is the mathematical definition of the income elasticity. Therefore, estimates of the slope coefficients of the model provide direct estimates of the elasticity for each variable.

By using regression analysis on equation (2), the following estimating equation is obtained:

$$(3) \quad \ln \left(\frac{P}{Pop}\right)_b = 6.902 + \underset{(2.767)}{.5910} \ln Y_b + \underset{(2.429)}{.9334} \ln A_b + \underset{(4.142)^{*}}{.4935} \ln V_{hb} \qquad r^2 = .78 \text{ (coefficient of determination)}$$

Once the basic estimating equation is obtained, an adjustment to the data is needed to calculate the current statewide imbalance between supply and demand. This is done by increasing the current number of physicians by the estimate of current unmet needs. This equation is defined by the following:

$$(4) \quad \left(\frac{P}{Pop}\right)_{bu} = \left(\frac{P}{Pop}\right)_b \cdot (1+\dot{u}) \qquad \text{where:}$$

$\left(\frac{P}{Pop}\right)_{bu}$ = The population ratio in the base year adjusted for current unmet need.

$\left(\frac{P}{Pop}\right)_b$ = The physician to population ratio in the base year period.

$\dot{u}$ = A percentage estimate of current unmet need.

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*The sample size is 21 observations. One observation on each variable for each county in New Jersey. The numbers in parentheses represent t values or estimates of degrees of statistical significance. With 21 observations and 16 degrees of freedom, the coefficients of the equation are significant at the 5% level of significance if the value of t exceeds 2.1. In other words, we are confident that 95 times out of 100 that the computed coefficients of the equation are different from zero.

By using the results of equation (3), the percentage increase in demand resulting from increases in the independent variables (i.e., age, income, etc.), as well as increases in national health insurance and productivity, can be obtained from the following equation:

(5) $\left(\frac{\dot{P}}{Pop}\right)_t = .5910\ \dot{Y}_t + .9334\ \dot{A}_t + .4935\ \dot{V}_{ht} + \dot{I}_t - \dot{Q}_{ts}$ where:

$\left(\frac{\dot{P}}{Pop}\right)_t$ = The percentage change in the physician to population ratio resulting from changes in the variables below.

$\dot{Y}_t$ = The percentage change in permanent income to time period t.

$\dot{A}_t$ = The percentage change in the age of the base year population to time period t.

$\dot{V}_{ht}$ = The percentage change in hospital services provided to time period t.

$\dot{I}_t$ = A projected estimate of the impact of national health insurance on the demand for physicians in time period t (1980-1985).

$\dot{Q}_{ts}$ = An estimate of productivity changes in the time period to 1980 and 1985.

The projected physician to population ratio is determined by applying the results of equation (5) to the following:

(6) $\left(\frac{P}{Pop}\right)_t = \left(\frac{P}{Pop}\right)_{bu} \cdot 1 + \left(\frac{\dot{P}}{Pop}\right)_t$ where:

$\left(\frac{P}{Pop}\right)_t$ = The projected population ratio in time period t.

Finally, the number of physicians demanded in any time period is determined from the following:

(7) $P_t = (\frac{P}{Pop})_t \cdot Pop_t$ where:

P_t = The number of physicians demanded in time period t.

Pop_t = The projected population in time period t.

For the remaining eleven professions for which the licensed model was used, the calculation of future demand is the same as shown above. For these professions, different equations were developed comparing county distribution to a number of variables. Therefore, the number of variables used in each and their coefficients vary across each equation. The specifications of each equation can be found in Appendix B.

C. The Dental Auxiliary Model

Dental auxiliaries are primarily employed in private practice settings. These professions include dental assistants, dental hygienists, and dental laboratory technicians. Unlike the majority of licensed professions, hard data on the utilization and distribution of these personnel are not available on a county basis. Accordingly, a regression based model, similar to that used for the licensed professions, cannot be developed for dental auxiliaries. Rather, a projection technique directly related to the supply of dentists is used to determine the future demand for these professionals.

The dental auxiliary model uses a simple ratio of auxiliaries to dentists to determine 1980 and 1985 demand. In all, five ratios are employed, two for dental assistants, two for hygienists, and one for laboratory technicians. The first ratios used for these professions are based on the 1975 supply of each to the supply of dentists. These data were developed from the licensure surveys of dentists and hygienists and the Occupation Employment Surveys of dental offices and laboratories. The second set of ratios is based on national counts of dentists, assistants, hygienists and laboratory technicians.(22) These ratios are shown in the following table:

	1975 New Jersey		1974 United States	
Profession	Supply	Ratio to Dentists	Supply	Ratio to Dentists
Dentists	4,244	-	107,320	-
Assistants	4,020	.947	118,000	1.1
Hygienists	769	.181	22,540	.21
Lab. Technicians	1,310	.309	32,000	.30

As the table indicates, the national ratios for assistants and hygienists are higher than those for New Jersey. This means that New Jersey dentists do not utilize auxiliaries to the same extent as dentists in other states. In order to estimate the impact on manpower resources if New Jersey dentists increased their utilization of these personnel, these national ratios are included in the projections for assistants and hygienists. To calculate future demand, the auxiliary-to-dentist ratios are multiplied by the 1980 and 1985 projected supply of dentists.

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(22) Department of Health, Education, and Welfare, Health Resources Statistics 1975, Rockville, Maryland, 1975.

D. Nurse Practitioner and Physician's Assistant Model

Beginning in 1975, the Department undertook an extensive research project to determine the potential demand for and supply of nurse practitioners and physician's assistants in primary care practice settings in New Jersey. This analysis was documented in a 1977 report entitled, "A Study of the Potential Need for Nurse Practitioners and Physician's Assistants in New Jersey". The results of the study are being presented herein so that this report provides all supporting data to be used in the Department's ongoing master planning activities.

Linear programming was used as the basis of the NP/PA model in order to measure the potential productivity gains incurred by the extensive use of both NPs and PAs. Data used in this model were provided by a survey of 2273 randomly selected New Jersey physicians in primary care specialties. The 547 physicians who responded to the survey provided information on current staffing configurations used in the production of twenty-four typical services which were estimated to account for over 70% of a physician's time. The survey also obtained the same specifications under a hypothetical practice situation in which there were no constraints on the hiring of NPs and PAs. For the hypothetical situation, physicians were asked to imagine a 10-20% increase in patient load and complete access to the health manpower labor market (i.e., if PAs were available for employment in N.J.). The linear programming model identified the most efficient mode of production in the "current" practice setting and in the hypothetical situation. Productivity gains were calculated by comparing the amount and kinds of manpower required by each model to produce a given quantity of health services. The analysis indicated that, if both NPs and PAs were efficiently utilized in the production of primary care services, New Jersey's private primary care practices would have the capacity to supply 40% more services to the public.

In this report, the manpower requirements needed to meet the needs in a hypothetical efficient system of office-based primary care are presented. Such a system would allow for the full employment of both NPs and PAs. In order to determine these requirements, a six step procedure was used, as follows:

1. A linear programming model selected the optimal production methods (i.e., staffing configurations) for each of the twenty-four services. These production methods specified the number of minutes each manpower category (physician, RN, NP, etc.) should spend in the production of one unit of each service if the service was to be produced at least cost.
2. The weekly demand for each service was calculated by multiplying the estimated number of physician practices performing the service by the average number of times each service was delivered per week in an office setting.
3. The weekly requirement for each category was calculated by multiplying the average weekly demand for each service by the optimal number of minutes of professional time to produce one unit of service.
4. The weekly minute requirements of all twenty-four services' for each manpower category (step 3) were summed up to derive the total minutes of professional time required to meet

weekly demand.

5. Using the estimate that the twenty-four services represent 72% of total primary care, the weekly minute requirements were adjusted to reflect the total (100%) demand for primary care and were translated into hours.
6. Finally, the weekly hour estimates were converted into full-time equivalents by using a 40 hour work week for both NPs and PAs.

Using the full-time equivalent data, health manpower demand for NPs and PAs were then calculated for the hypothetical system in which these professions could be utilized by the primary care physician.

To determine the supply of nurse practitioners and physician's assistants, two methods were used. For NPs, data on current supply were provided by the Pediatric Nurse Practitioner Forum. Using this data as a base year count, future supply was calculated based on the output of New Jersey's NP programs through the projection period. Future supply of PAs was calculated from anticipated output from New Jersey's current program jointly run by CMDNJ and Livingston College of Rutgers University. Also, in-migration of PAs was estimated based on a survey of regional PA programs in neighboring states.

It should be noted that this study was a first attempt by the Department to quantify the potential need for NPs and PAs in New Jersey. As such, it has some limitations which should be understood prior to using its results. First, this study only concerns itself with one sector of the service delivery network, namely office-based primary care. Therefore, the estimates of potential need for NPs and PAs are only partial ones, as these professionals would be demanded in a number of other settings, such as hospitals and health maintenance organizations. Second, this analysis is based on the assumption of the legality of employment of these health professionals. Since physician's assistants could not legally practice in New Jersey during the project period, the results of this study are based on physicians' perceptions of how they could best utilize NPs and PAs rather than by a study of practices actually using new health practitioners. Further, due to the complexity of the physician questionnaire, a high non-response rate did occur. Therefore, one must be particularly cautious in drawing inferences about the physician population. Consequently, it is recognized that those physicians who chose to respond may be especially favorable toward the use of new health practitioners. Their attitudes and preferences may or may not be typical of the physician population at large. Therefore, appropriate interpretation of the study's results must recognize a possible selection bias within the survey data with the following caveat: the results of the study measure the potential need for NPs and PAs and the productivity gains possible through their efficient use in primary care, but only if the perceptions and attitudes of New Jersey primary care physicians in general were to match or change to correspond to this possibly select, innovative respondent group.

E. The Non-Licensed Health Professions Model

In order to develop data counts on non-licensed professions, county level data based on the Department of Higher Education's 1974 employment survey were aggregated with statewide results of the Occupational Employment Surveys of health settings. Since the resulting data were applicable only to statewide supply, a special method for developing a demand projection model was needed. The method chosen was an institutional-based model.

Using the Department of Health's Standard Hospital Accounting and Rate Evaluation (SHARE) system, 1975 data on all 106 reporting hospitals were drawn to create the data base needed to develop the equations for the non-licensed professions. The individual hospital data used from the SHARE system included hospital type and ownership, certified inpatients, certified patient days, maintained beds and service section employment hours, salaries and units of services. Of the twenty-six service sections in the data base, five were studied in depth in an attempt to develop the equations. These service sections were dietary, laboratory, medical records, nuclear medicine, and respiratory therapy. Also, five data elements missing from the SHARE system were taken from the AHA Guide to Hospitals, including admissions, occupancy rates, total expenses, payroll expenses, and personnel. Using these data, it was possible to develop valid equations for three of the five service centers: laboratory, medical records and respiratory therapy. These equations were developed using the service center personnel hours as the dependent variable of the regression equation and data items such as inpatient admissions, emergency room visits, outpatient visits, average length of stay, certified inpatient days, certified maintained beds, non-payroll expense, and average service center wages as the independent variables:

The resulting equations are comparable to equation (5) in the discussion of the licensed professions methodology (page 18). For example, the final equation for laboratory services is:

$$\dot{HRS}_t = \underset{(12.9)}{1.026}\ \dot{V}_t + \underset{(3.6)}{.626}\ \dot{ALOS}_t + \underset{(3.4)}{.585}\ \dot{EXP}_t + \dot{I}_t - \dot{Q}_{ts} \text{ where:}$$

$\dot{HRS}_t$ = the percentage change in laboratory personnel hours resulting from changes in the variables below.

$\dot{V}_t$ = the percentage change in total visits (inpatient, emergency, and outpatient) to time period t.

$\dot{ALOS}_t$ = the percentage change in average length of stay to time period t.

$\dot{EXP}_t$ = the percentage change in non-payroll expenses per bed (total expense - payroll expenses divided by beds).

$\dot{I}_t$ = a projected estimate of the impact of national health insurance on the demand for medical services in time period t (1980-1985)

$\dot{Q}_{ts}$ = an estimate of the productivity changes in the time periods to 1980 and 1985.

The t-values are shown in parenthesis below each of the three independent variables. In each case, these values are above 1.96, which means that they are significant to the 95% confidence level. The resultant equations for medical records and respiratory therapy can be found in Appendix B.

It was not possible to develop statistically sound equations with the SHARE information for dietary services and nuclear medicine. Therefore, the three professions included in these service areas had to be treated with different methods. Because nuclear medicine was related to radiologic technology, the demand for nuclear medicine technologists is calculated using the radiologic technicians equation explained in the licensed professions methodology.(23) However, there was no related professional equation to use as a proxy for the dietary professions. Therefore, the equation first used in the Health Professions Education Master Plan was used to project the demand for dietitians and nutritionists.(24)

F. Method for Confidence Band Calculation

As previously noted, the projection of future manpower requirements is not an exact science. Since the Department of Higher Education first began to develop manpower projections, there has been a need for a technique to assess the accuracy of our projections. A method has now been developed to determine the range of accuracy of the projections of demand. Specifically, this technique enables us to place upper and lower limits within which there is a 95% confidence that demand will occur. It is now used for the majority of the demand projections in this report.

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(23) A similar decision was made to use the physical therapy equation for occupational therapists since there were no data available specifically dealing with occupational therapists.

(24) op. cit., Department of Higher Education, Appendix E, p. 219.

As described in the past sections, the projections of demand for health professionals are based on the results of regression models. The coefficients of the regression equations represent estimates of the slope of the estimated regression line (page 17). Also, the slope of the independent variable is related to the dependent variable by the following equation:

(1) $B_j = \frac{\Delta \ln D_j}{\Delta \ln X_j} = \frac{\%\Delta D_j}{\%\Delta X_j}$ where:

B_j = the regression coefficient of the j^{th} independent variable

D_j = the logarithm of the demand for j^{th} occupation (i.e., nursing, dentistry, etc.)

X_j = the logarithm of the j^{th} independent variable (i.e., population, income, etc.)

It follows that the change in the logarithm (ln) of any number is equal to its percentage change. In addition, equation (1) is the mathematical definition of an elasticity and is interpreted as the percentage change in the dependent variable resulting from a percentage change in the independent variable.

The elements of equation (1) can be rearranged in order to project the relative or percentage change in the dependent variable, for projected changes in the independent variables. From equation (1), the following equation is derived:

(2) $\dot{D}_j = \sum_{j=1}^{n} C_j B_j$ where:

$\dot{D}_j$ = the relative change in the dependent variable ($\%\Delta D_j$) and

C_j = the relative change in the j^{th} independent variable ($\%\Delta D_j$).

It is possible to estimate a confidence interval around the projected values (i.e., growth rates) of the dependent variable. This calculation provides a low, midpoint and high estimate of demand at an assumed level of confidence (95%). In order to calculate the confidence interval, the mean (expected value) and variance of the $\dot{D}_j$ must be determined.

From equation (2), it was determined that the growth rate of demand for occupation j is a linear function of the growth rates of all the independent variables. The mean growth rate must also be a linear combination of the independent variables. Thus, we have:

(3) $E(\dot{D}_j) = C_j\ E(B_j)$ where:

$E(\dot{D}_j)$ = the expected (mean) value of the growth rate in demand for occupation j,

$C_jE(B_j) = C_jB_j \cdot P(B_j)dB_j$ and

$P(B_j)dB_j$ = the probability distribution of the j^{th} regression coefficient.

By definition the variance around the mean projected growth rates $E(D_j)$ is defined as follows:

(4) $\sigma^2\dot{D}_j = \int_{-\infty}^{+\infty} \left[\dot{D}_j - E(\dot{D}_j)\right]^2 \cdot P(\dot{D}_j)d\dot{D}_j$

Substituting equation (2) and (3) into equation (4), we have:

(5) $\sigma^2\dot{D}_j = \int_{-\infty}^{+\infty} \left[C_jB_j - CjE(B_j)\right]^2 \cdot P(B_j)dB_j$

Equation (5) indicates that the variance of the mean projection is a linear combination of the variances of the regression coefficients. This equation can be simplified by removing from the integral sign the weights (growth factors) which are constant from each regression coefficient. Therefore, equation (5) can be rewritten in the following manner:

(6) $\sigma^2 D_j = \sum_{j=1}^{n} C_j^2 \int_{-\infty}^{+\infty} \left[B_j - E(B_j)\right]^2 . \; P(B_j)dB_j = \sum_{j=1}^{n} C_j^2 \sigma^2 B_j$ where:

$\sigma^2 B_j$ = the variance of the jth regression coefficient

Equation (6) is valid provided that the regression coefficients are independent of one another. If the coefficients are correlated, equation (6) takes the following form:

(6A) $\sigma^2_{D_j} = \sum_{j=1}^{n} C_j^2 \sigma_{B_j} + 2 \sum_{j=1}^{n} \sum_{k=j+1}^{n} C_j . C_k \;\; \sigma_{B_jB_k}$ where:

$\sigma_{B_jB_k}$ = the covariance between the jth and kth regression coefficient.

Where the covariance in equation (6A) is equal to:(25)

(6B) $\sigma_{B_jB_k} = \dfrac{-\sigma_u^2 \; \Sigma x_jx_k}{\Sigma x_j^2 \Sigma x_k^2 - (\Sigma x_j \Sigma x_k)^2}$ where:

σ_u^2 = standard error of estimate of the regression line

Σx_j^2 = the sum of the squared values of the jth variable measured in deviation from the mean of the jth variable.

$\Sigma x_j x_k$ = the sum of the cross products measured in deviations from the mean of variable j and variable k.

Because we cannot assume that the coefficients used in the regression equation are independent, equation (6A) is used with equation (3) to allow for the calculation of the confidence interval around the projected mean demand growth rate. This is calculated using the following formula:

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(25) Ralph E. Beals, Statistics for Economics: An Introduction, Rand McNally, Chicago, 1972 , p. 273)

(7) $E(\dot{D}_j) \pm t\alpha \left(\frac{\sigma \dot{D}_j}{\sqrt{N}}\right)$ where:

$t\alpha$ = the value of students t at a preselected level of confidence (α = .025, two tailed or 95% Confidence Band)

$\sigma \dot{D}_j$ = the standard error of the dependent variable calculated from equation (6)

N = the number of observations in the regression.

As was discussed above, the best estimate of the expected value of the regression coefficient $E(B_j)$ is the computed regression parameter from a single sample (B_j). Therefore, in the equations presented above, B_j will be used to estimate $E(B_j)$ and $\dot{D}_j = E(\dot{D}_j)$.

It should be noted that, in the case of dental auxiliaries, a confidence interval could not be directly calculated as there are no available regression results. In order to provide an indication of the possible fluctuation of the demand projections, the confidence band derived from the dental demand regression is applied to the dental auxiliary projections. Also, it was not possible to develop a confidence band for the dietitian and nutritionist projections which were developed for the *Health Professions Education Master Plan*.

III. PROJECTION RESULTS

A. Physicians

An analysis of the future supply and demand for physicians in New Jersey was recently published by the Department.(26) This study showed that New Jersey is moving towards an equilibrium between the supply and demand for physicians, as indicated in Table 1, on the following page, and Graph 1, page 34.

While these projections indicate a favorable manpower situation, recently enacted federal legislation (P.L. 94-484) providing strict limitations on the immigration of foreign medical graduates (FMG's) into the United States will, by 1982, have a substantial impact on the projected growth of the State's supply of physicians. New Jersey depends upon an unrestricted flow of FMG's for a majority of its new licentiates. The demanding set of admissions requirements in P.L. 94-484 may reduce the immigration of FMG's up to 80%, thereby greatly decreasing the inflow of new physicians into the State. Consequently, by 1982, we anticipate a no-growth situation with regard to physician supply. That is, the number of physicians who enter practice will not be sufficient to replace those who leave it due to death, retirement, etc. Therefore, this legislation may create a shortage of approximately 1900 practitioners, or 13% of the projected physician supply by that time (Table 2, page 33, and Graph 2, page 35). However, the exact level of this shortage will depend on what actions the State takes to alleviate its dependence on FMG's.

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(26) Department of Higher Education, An Analysis of the Need for Physicians in New Jersey 1975-1985, Health Manpower Planning Series Report Number One, Trenton, December 1977.

TABLE 1

Status Quo Supply, Demand and Need for Full-time Equivalent Physicians 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	11,590	-	-
1980	14,000	13,770 ± 170	+230
1985	16,040	16,300 ± 400	-260

*Manpower Need is taken at the midpoint of demand and calculated as Supply minus Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

TABLE 2

Supply, Demand and Need for Full-time Equivalent Physicians Under Immigration Restrictions of P.L. 94-484 1975-1985

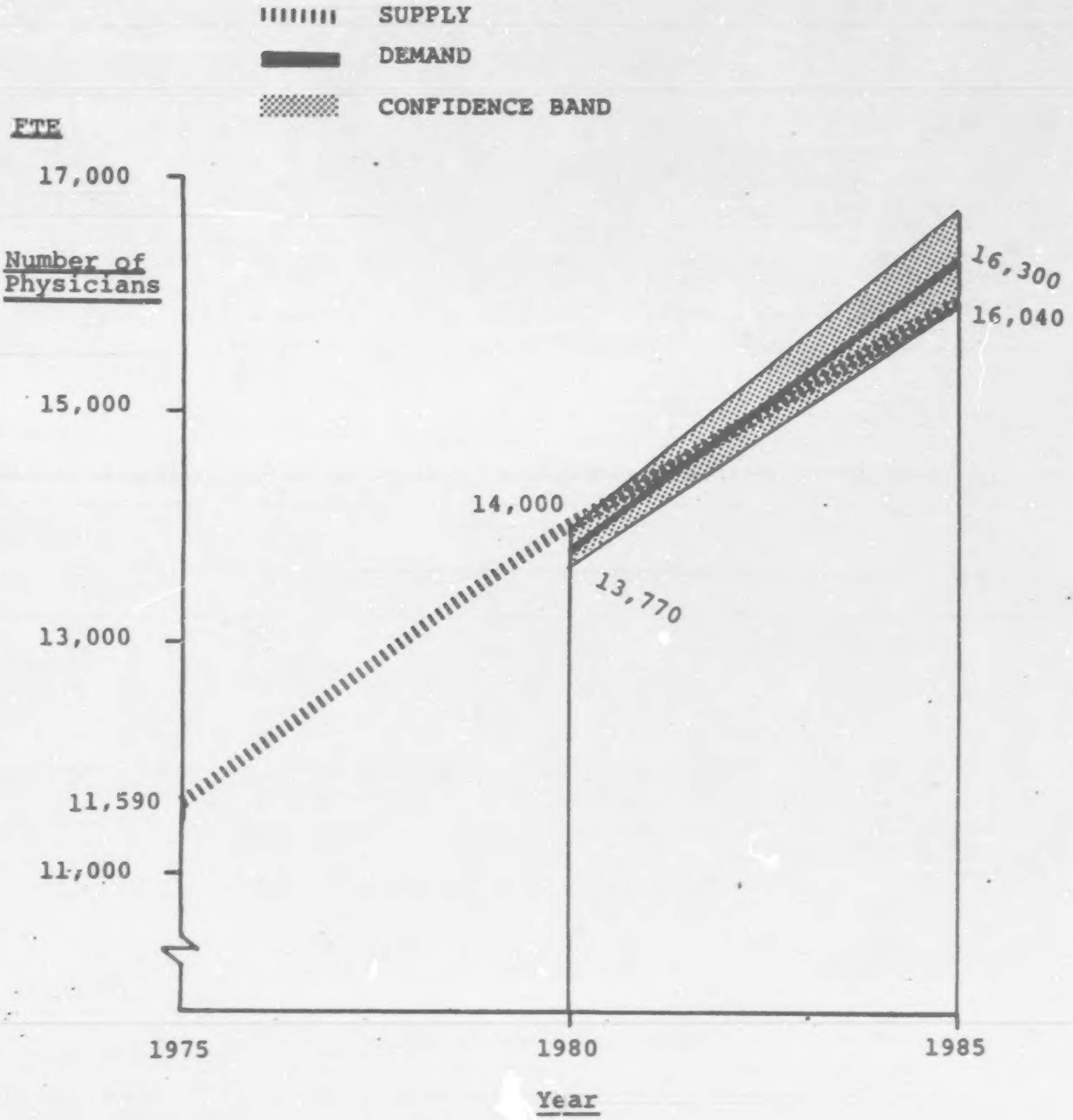
Year	Supply	Projected Demand	Manpower Need*
1975	11,590	-	-
1980	14,000	13,770 ± 170	+230
1985	14,400	16,300 ± 400	-1,900

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 1

Status Quo Supply and Demand for Full-Time Equivalent Physicians

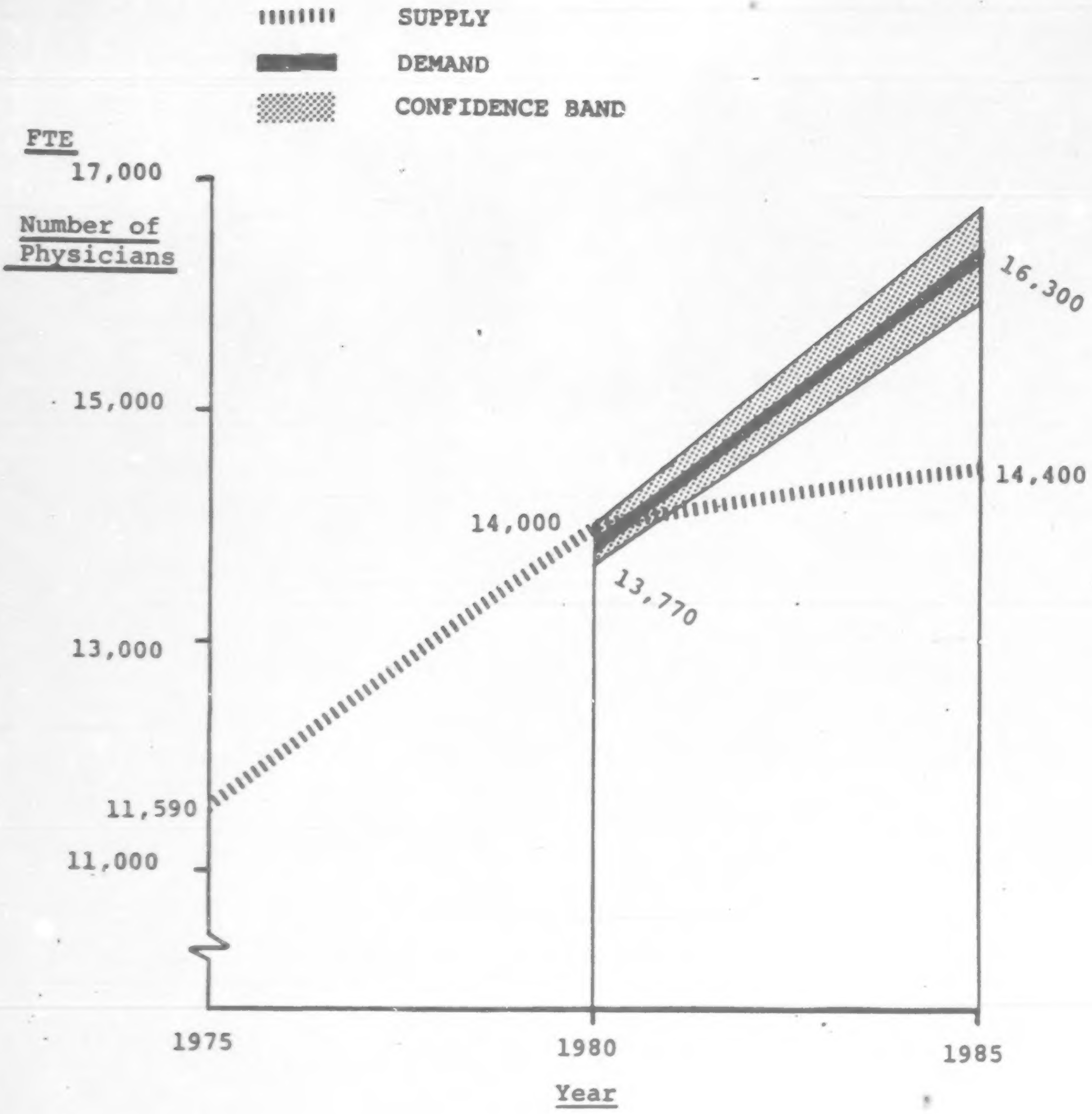
1975-1985



GRAPH 2

Supply and Demand for Full-Time Equivalent Physicians Under Immigration Restrictions of P.L. 94-484

1975-1985



B. Dental Personnel

1. Dentists

The results of the projections of supply and demand for dentists through 1985 are shown on Table 3, below, and Graph 3, on the following page. These projections indicate that by 1980 a small surplus of 40 dentists is projected. By 1985, this surplus situation is expected to change to a three per cent shortage in which 180 additional dentists would be needed. The growth in demand between 1980 and 1985 which causes this shortage is a function of the four per cent aggregate impact of expanded dental insurance coverage mentioned in Appendix B. However, since the lower limit of the demand confidence band nearly equals projected 1985 supply, this shortage of dentists should not be considered to be a substantial one.

TABLE 3

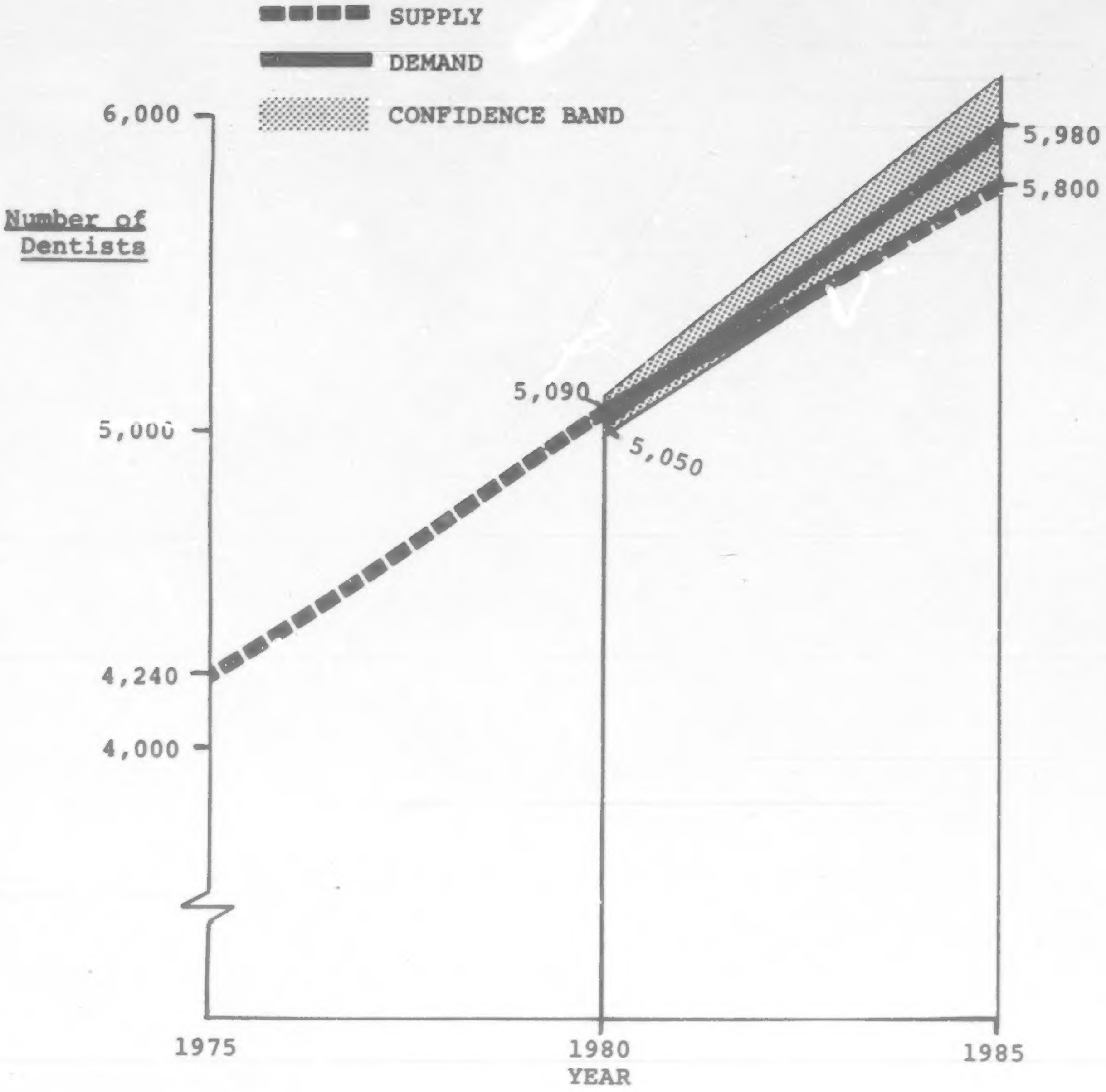
Supply, Demand and Need for Full-time Equivalent Dentists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	4,240	-	-
1980	5,090	5,050 ± 70	+40
1985	5,800	5,980 ± 160	-180

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 3

Supply and Demand for Full-time Equivalent Dentists in New Jersey 1975-1985



2. Dental Assistants

The projection of manpower demand for dental assistants was developed using a ratio approach. There are two ratios of assistants to dentists incorporated into two sets of projections. In the first, the base year ratio of dental assistants to dentists in New Jersey (.947) is used to project demand in 1980 and 1985. This is done by multiplying the projected full-time equivalent supply of dentists in those years by the .947 ratio. The results of this current ratio approach are provided in Table 4, page 39, and Graph 4, page 40. These data indicate that a two and a half per cent surplus of assistants is expected by 1980. This surplus will grow to a level of nine per cent, or 550 dental assistants by 1985.

The second ratio approach used for dental assistants incorporates the national ratio of assistants to dentists in 1974 as the basis of the demand calculation. This alternative model was chosen to exemplify what the future demand for dental assistants could be if New Jersey's dentists employed these personnel to as great a degree as dentists do elsewhere. If this were the case, the demand for dental assistants would exceed projected supply in both 1980 and 1985. However, continuing output of New Jersey's current programs would cut this potential shortage in half from a level of 13% in 1980 to 6% or 340 dental assistants in 1985. Table 5 and Graph 5, pages 39 and 41, detail the results of these national ratio based projections.

TABLE 4

Supply, Demand and Need for Dental Assistants at a Continuing New Jersey Ratio, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	4,020	-	-
1980	4,950	4,820 ± 60	+130
1985	6,040	5,490 ± 130	+550

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

TABLE 5

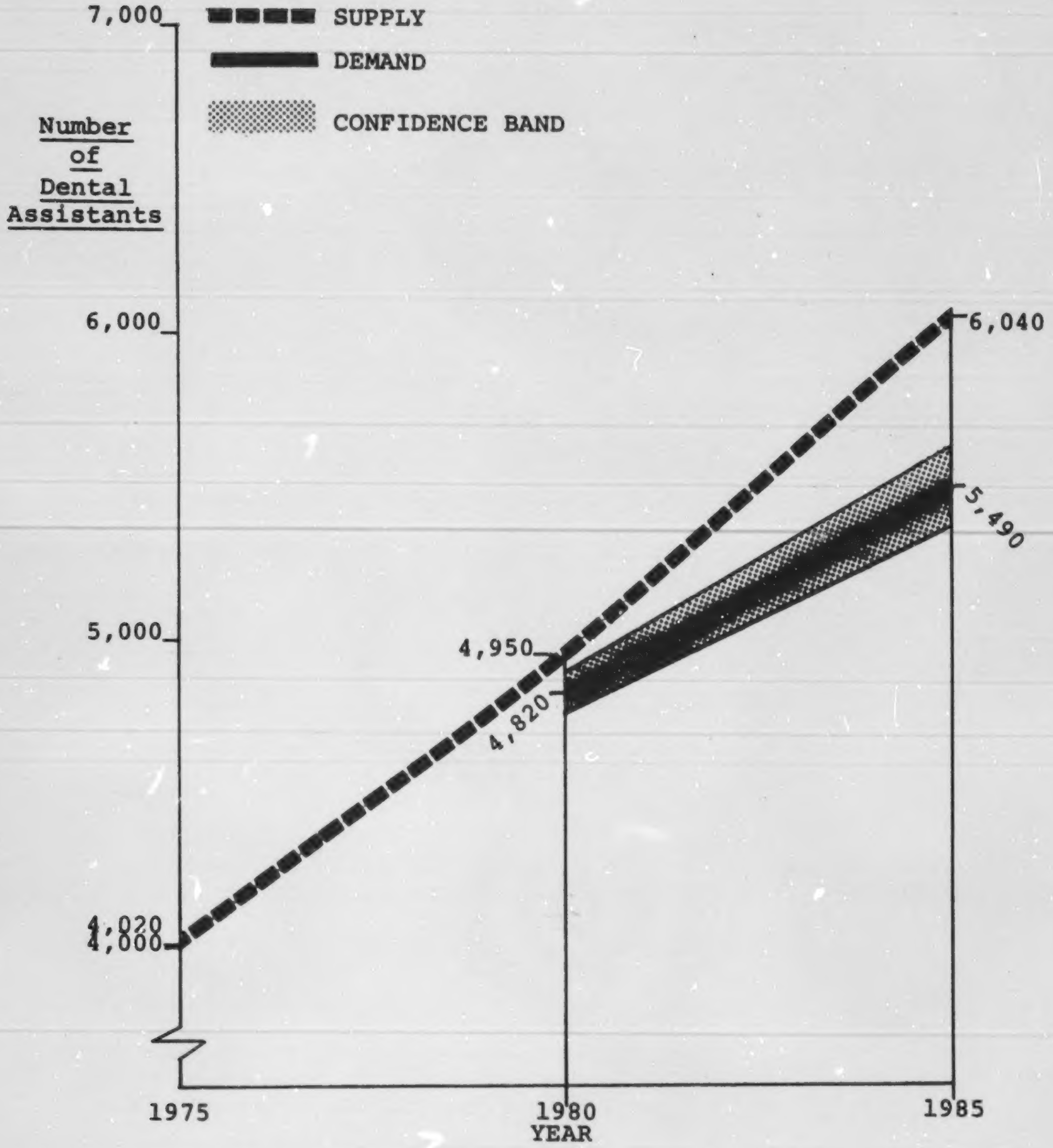
Supply, Demand and Need for Dental Assistants at an Expanded National Ratio, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	4,020		
1980	4,950	5,600 ± 70	-650
1985	6,040	6,380 ± 150	-340

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

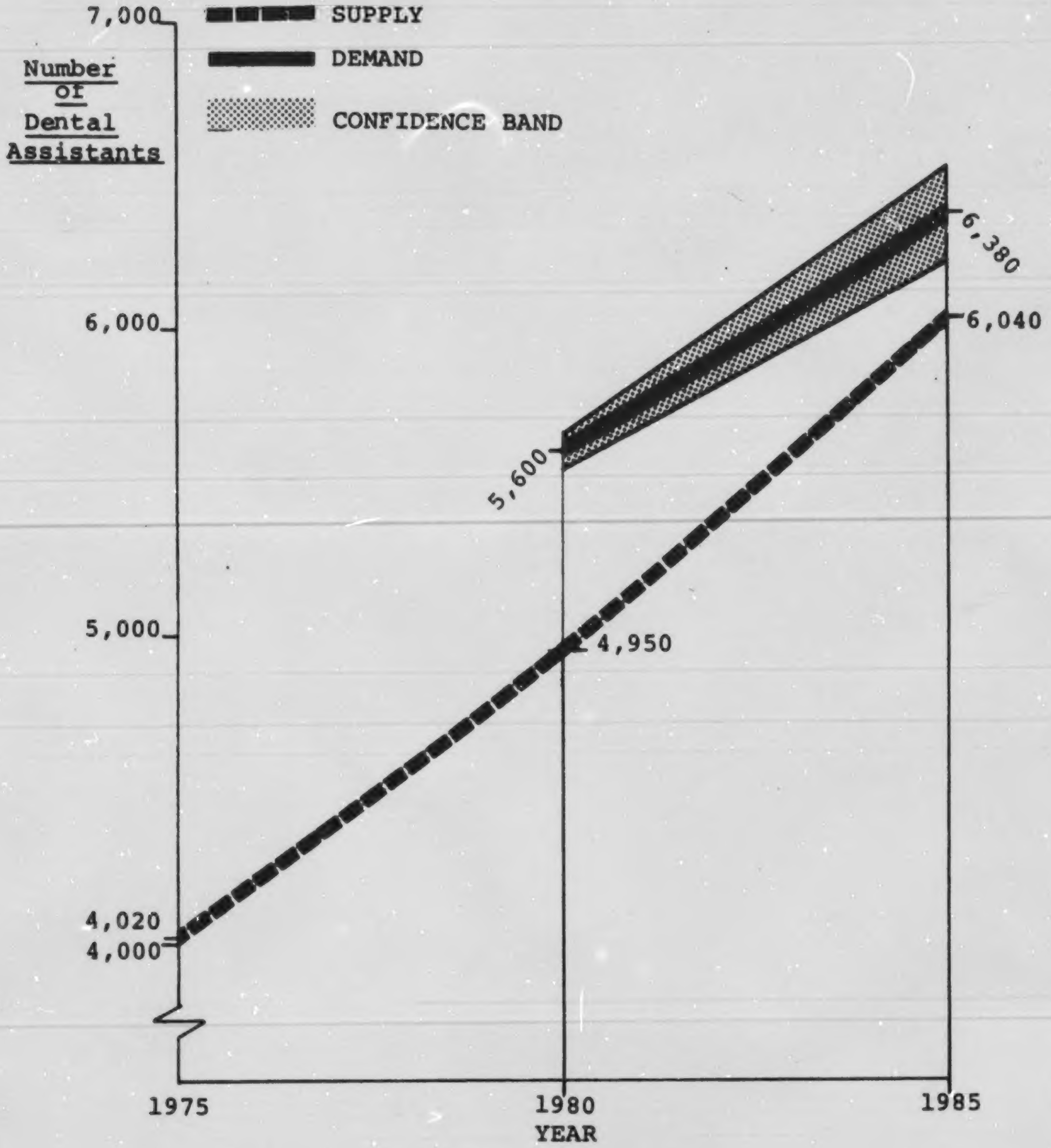
GRAPH 4

Supply and Demand for Dental Assistants at a Continuing New Jersey Ratio 1975-1985



GRAPH 5

Supply and Demand for Dental Assistants at a Expanded National Ratio, 1975-1985



3. Dental Hygienists

The two ratio approach used for dental assistants was also used for dental hygienists. The New Jersey ratio of dental hygienists to dentists is smaller than the national ratio. This means that proportionately fewer dentists in New Jersey use dental hygienists than do dentists nationally. Table 6, page 43, and Graph 6, page 44, display the future supply and demand for dental hygienists in New Jersey at the current ratio, which is .181 dental hygienists per dentist. The current ratio projections indicate that, by 1985, New Jersey will have a four per cent surplus of dental hygienists, (i.e., a surplus of 40 dental hygienists). However, if New Jersey dentists were to employ dental hygienists at a proportion equal to the national average, a shortage of dental hygienists in the state would occur. This shortage would not be an expanding one, however, as educational output would diminish the shortage from one of 18.5% in 1980 to 12%, or 130 dental hygienists in 1985. This second set of projections is exhibited in Table 7, page 43, and Graph 7, page 45.

TABLE 6

Supply, Demand and Need for Full-time Equivalent Dental Hygienists at a Continuing New Jersey Ratio, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	769	-	-
1980	902	921 ± 11	-19
1985	1,090	1,050 ± 25	+40

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

TABLE 7

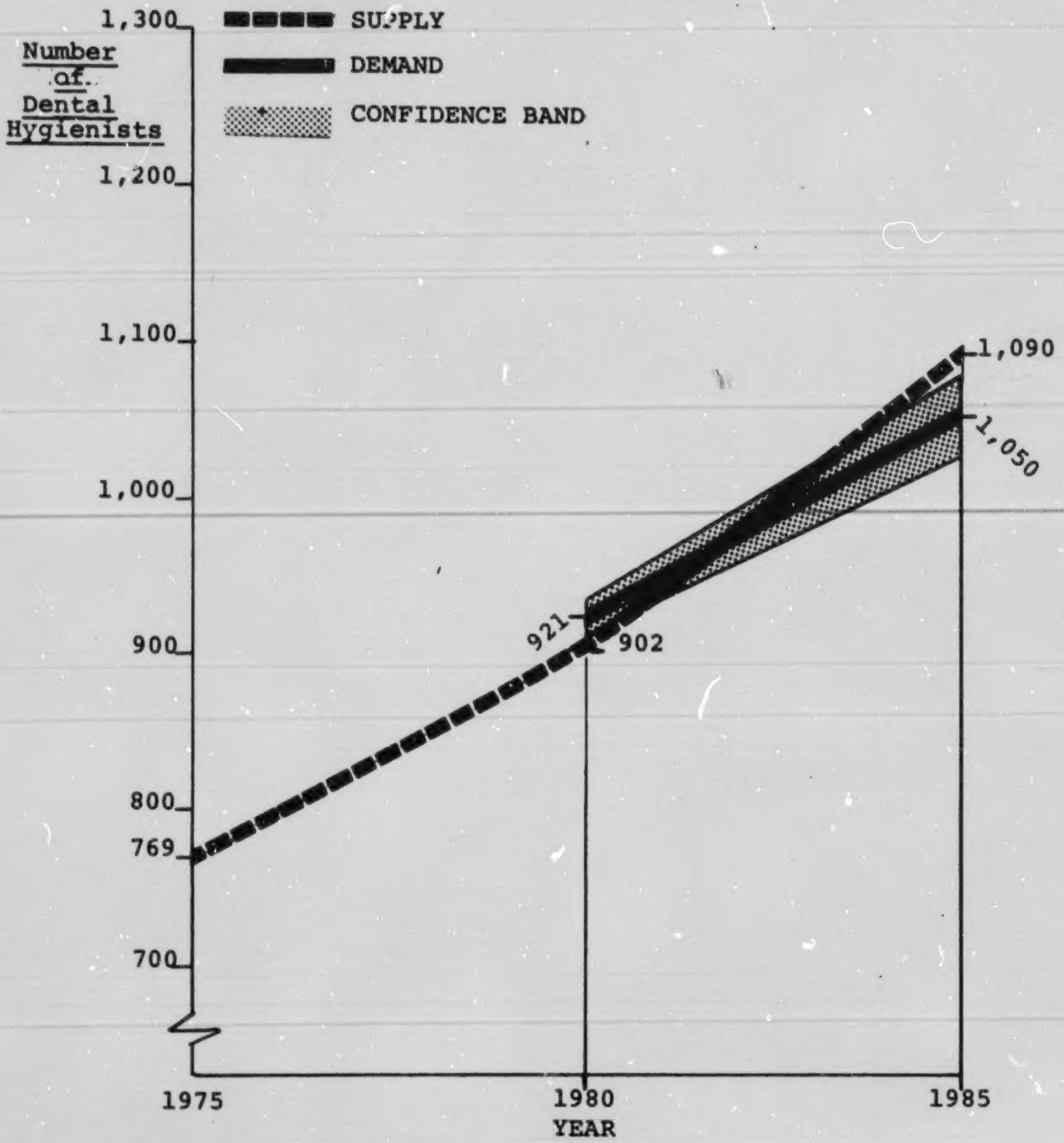
Supply, Demand and Need for Full-time Equivalent Dental Hygienists at an Expanded National Ratio 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	769	-	-
1980	902	1,070 ± 15	-168
1985	1,090	1,220 ± 30	-130

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

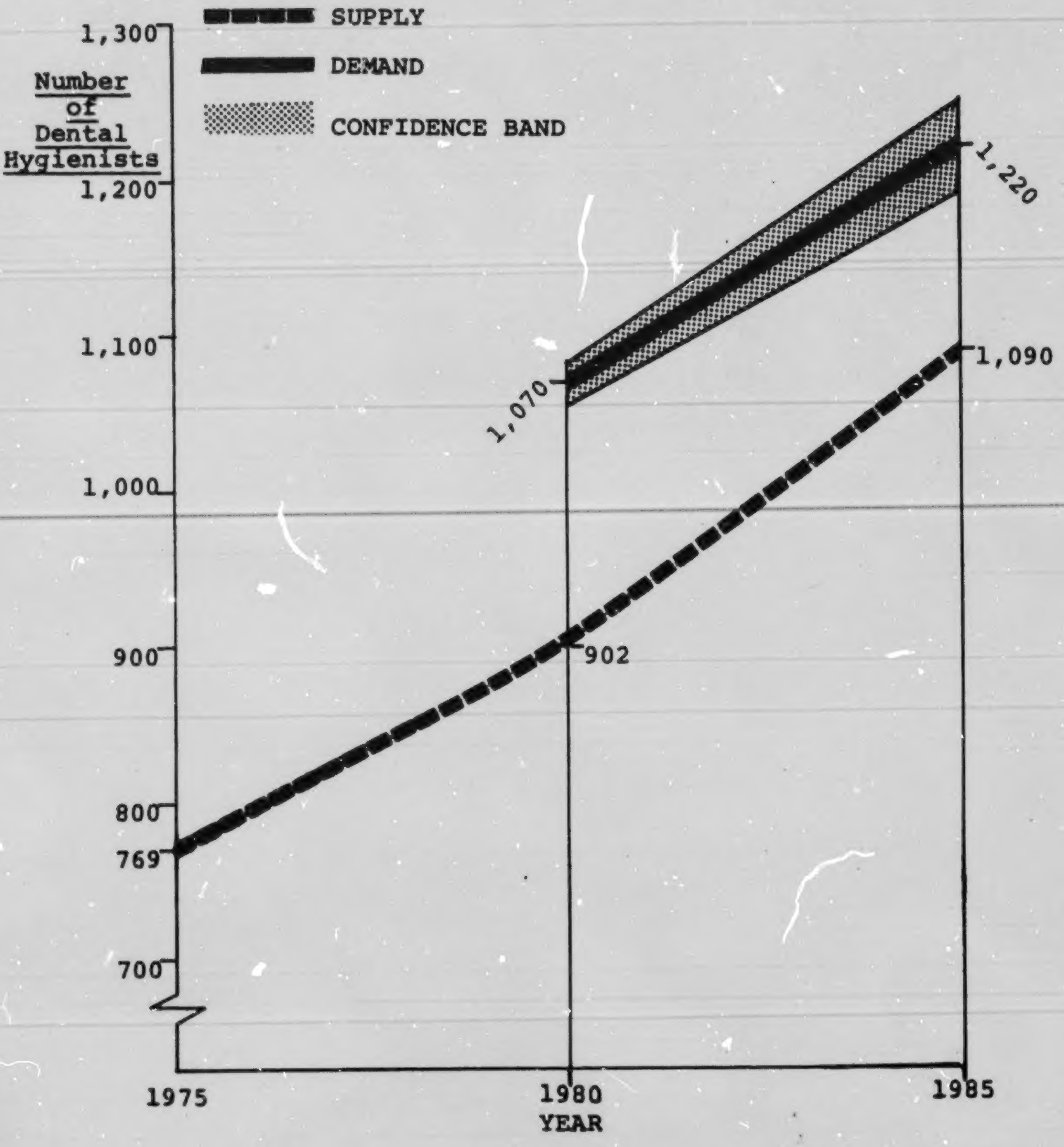
GRAPH 6

Supply and Demand for Full-time Equivalent Dental Hygienists at a Continuing New Jersey Ratio 1975-1985



GRAPH 7

Supply and Demand for Full-time Equivalent Dental Hygienists at an Expanded National Ratio, 1975-1985



4. Dental Laboratory Technicians

Unlike the situation with assistants and hygienists, the utilization of dental laboratory technicians in New Jersey is proportionately the same as their national utilization. Accordingly, only one set of projections has been developed for this profession. These projections, which are shown in Table 8, below, and on Graph 8, on the following page, indicate that there will be a nine per cent shortage of these personnel in 1980. By 1985, the absolute size of this shortage will remain relatively stable at approximately 140 technicians. This finding of a projected shortage situation is in conformance with the projections made in the Master Plan. However, the size of this newly projected shortage is substantially smaller than the original Master Plan.

TABLE 8

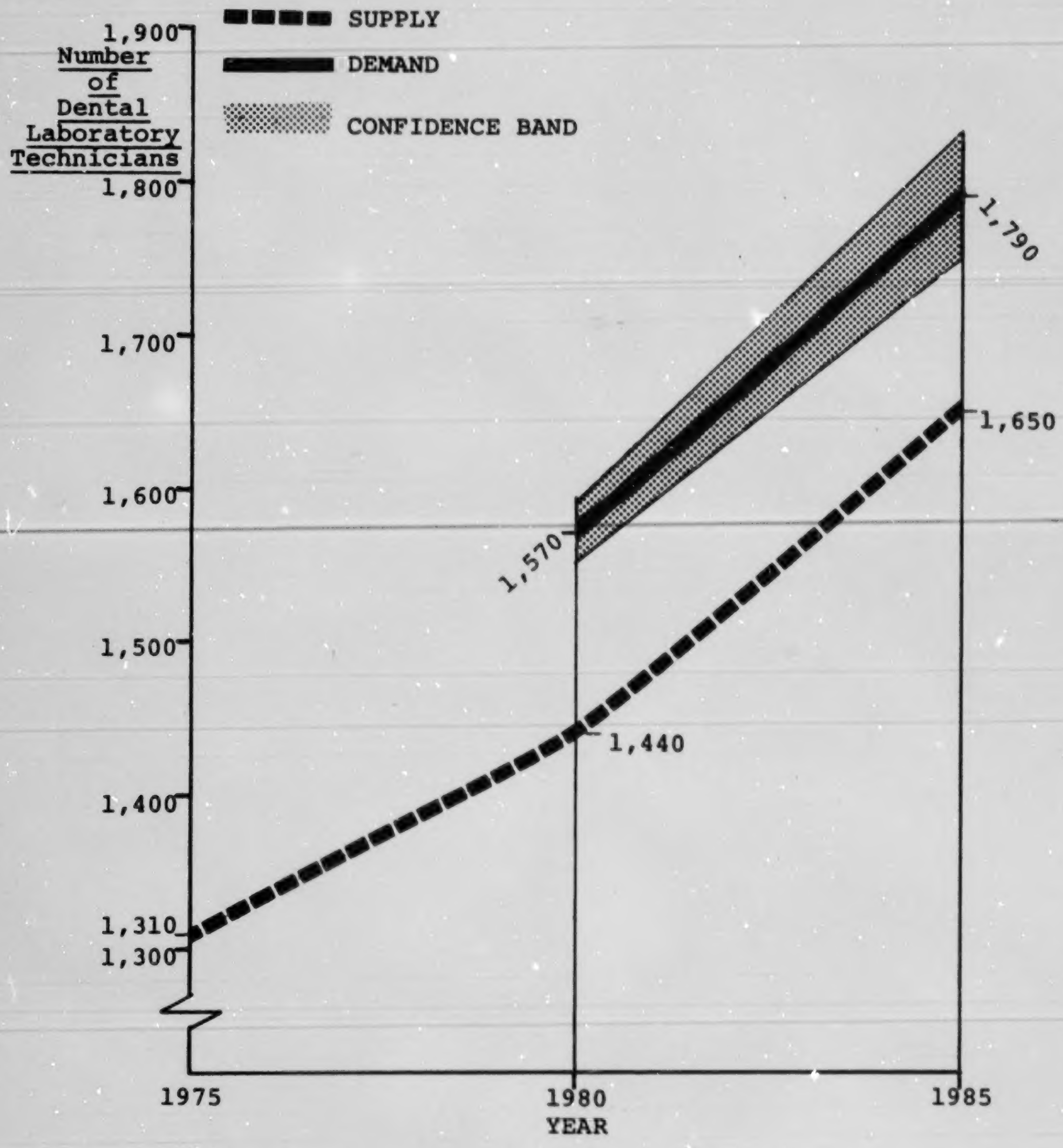
Supply, Demand and Need for Dental Laboratory Technicians in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	1,310	-	-
1980	1,440	1,570 ± 20	-130
1985	1,650	1,790 ± 40	-140

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 8

Supply and Demand for Dental Laboratory Technicians in New Jersey, 1975-1985



C. Nurses

In 1977, the Board of Higher Education adopted a moratorium policy with regard to nursing programs. This policy places caps on enrollments in associate, diploma and baccalaureate nursing programs until 1980. Since this policy was adopted, a new set of supply and demand projections has been developed for nurses. These new projections indicate that a surplus of nurses is still anticipated in 1985, though it will be a 3% surplus rather than a 7% surplus as projected in the Department's 1976 nursing analysis.(27) In part, this reduction in the size of the projected surplus is due to the effect of the Board's policy on limiting growth in nursing programs.

Two sets of projections are presented here. The first, displayed in Table 9 (page 49) and Graph 9 (page 50), shows the effect of continuing the enrollment cap policy throughout the projection period. The second set in Table 10 (page 49) and Graph 10 (page 51) indicates the impact of ending the nursing moratorium policy in 1980. A comparison of these two sets of projections shows an insignificant difference between them. This is caused by the timing needed for the additional nursing students to enter the workforce after the caps are ended (i.e., 1982 for ADNs, 1984 for BSNs). A more substantial difference would exist if the projections were carried out to 1990.

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(27) Department of Higher Education, "An Analysis of the Need for Nursing Personnel in New Jersey", Trenton, November 1976.

TABLE 9

Supply, Demand and Need for Professional Nurses under Current Enrollment Policy, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	39,040	-	-
1980	47,500	46,050 ± 550	+1,450
1985	56,200	54,800 ± 1,700	+1,400

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

TABLE 10

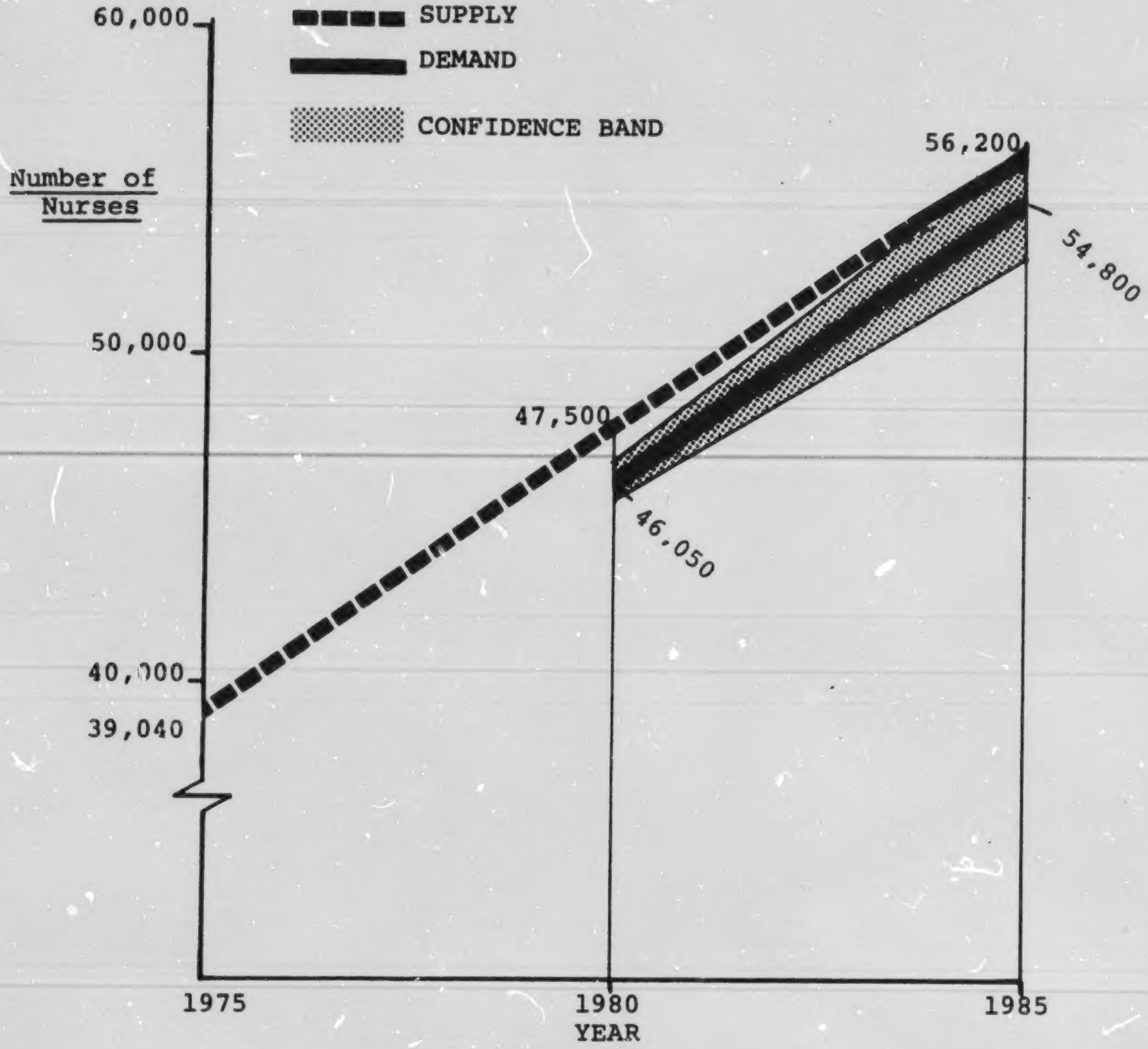
Supply, Demand and Need for Professional Nurses with Current Enrollment Policy Ending in 1980, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	39,040	-	-
1980	47,500	46,050 ± 550	+1,450
1985	56,500	54,800 ± 1,700	+1,700

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

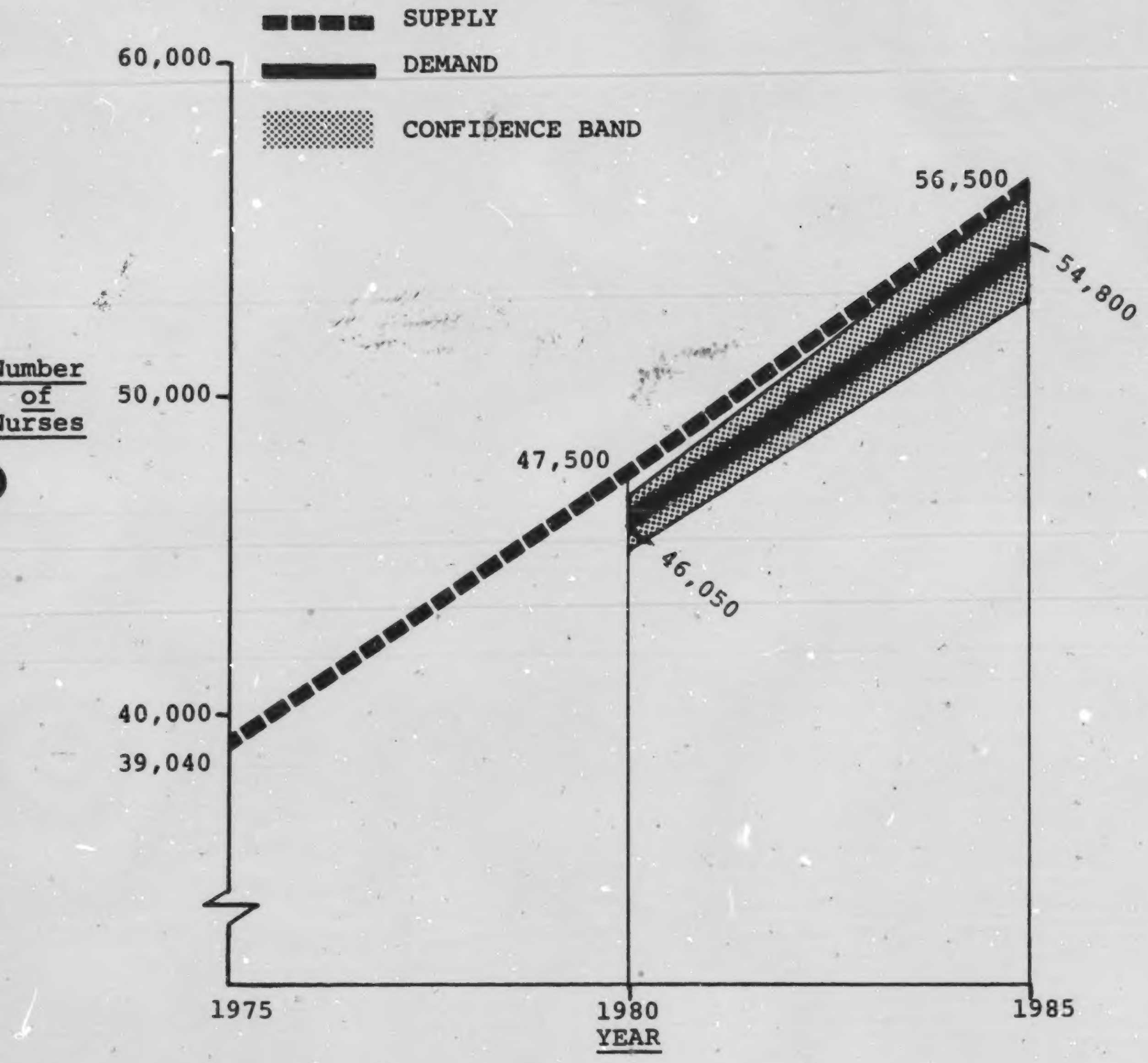
GRAPH 9

Supply and Demand for Nurses Under Current Enrollment Policy 1975-1985



GRAPH 10

Supply and Demand for Nurses with Enrollment Policy Ending in 1980, 1975-1985



D. Nurse Practitioners and Physician's Assistants

The projections of the potential manpower requirements for nurse practitioners and physician's assistants were developed from a theoretical model concerned with office-based primary care utilization of these personnel. As noted in the discussion of the NP/PA model, these data are taken from a hypothetical practice model in which both these professions would be fully employable. Therefore, limitations to these projections do exist and are specified on page 24.

The nurse practitioner manpower requirements for the hypothetical office-based system are presented in Table 11, on the following page, and Graph 11, page 54. As these data indicate, given an efficient office-based primary care delivery system, there would be a substantial need for nurse practitioners in New Jersey. In 1980, a supply of 192 NPs would compare with a projected demand for 715 of these personnel, thereby creating a shortage of 523 NPs. In 1985, the supply of NPs would grow to 319, yet the need gap would increase to 589 due to expanding demand for these nurses.

For physician's assistants, projected supply and demand are presented for 1980 and 1985. These data are shown in Table 12, page 53, and Graph 12, page 54. As with the projections of need for NPs, these projections indicate an expanding need for these personnel. Supply is expected to grow from 109 in 1980 to 230 in 1985, under the assumption that PAs could be employed in New Jersey. The corresponding projections of demand grow from 598 in 1980 to 759 in 1985. Accordingly, the theoretical need for PAs expands from 489 to 529 in 1985.

TABLE 11

Theoretical Supply, Demand, and Need for Nurse Practitioners in an Efficient Office-Based Primary Care Delivery System 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	100	563	-463
1980	192	715	-523
1985	319	908	-589

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

TABLE 12

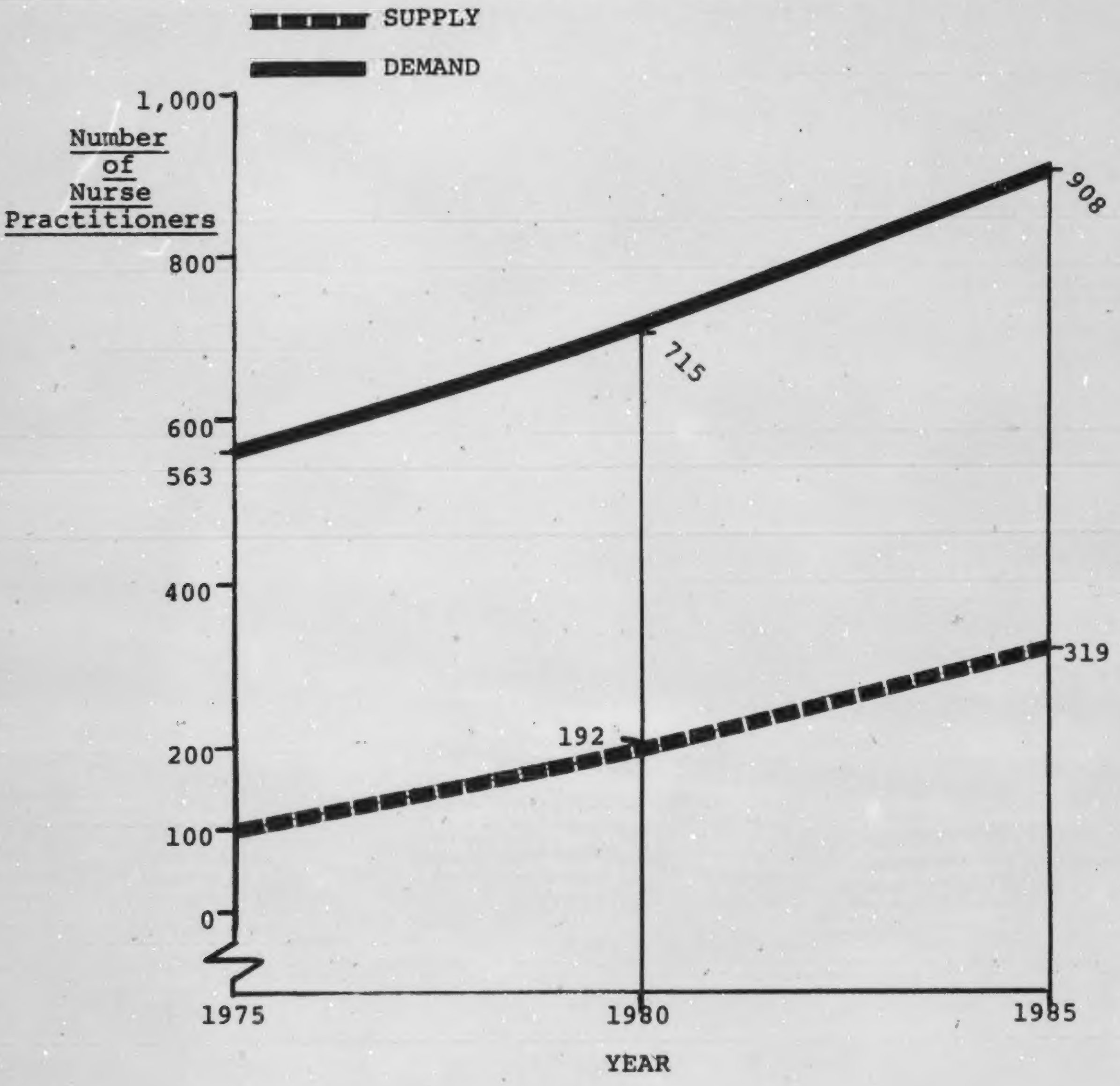
Theoretical Supply, Demand and Need for Physician's Assistants in an Efficient Office-Based Primary Care Delivery System 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	-	-	-
1980	109	598	-489
1985	230	759	-529

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

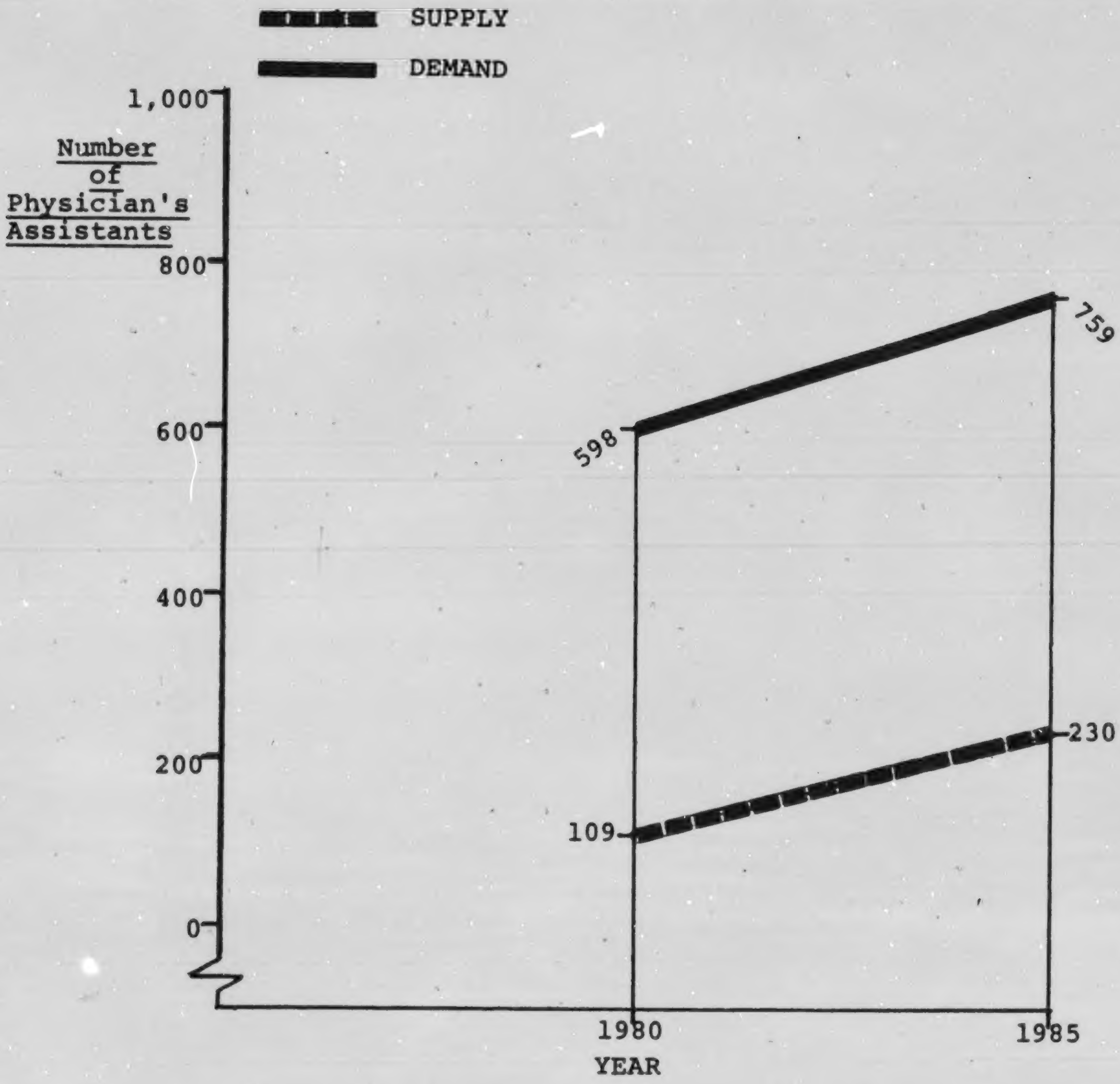
GRAPH 11

Theoretical Supply and Demand for Nurse Practitioners in an Efficient Office-Based Primary Care Delivery System 1975-1985



GRAPH 12

Theoretical Supply and Demand for Physician's Assistants in an Efficient Office-Based Primary Care Delivery System 1980-1985



E. Optometrists

The projections of supply and demand for full-time equivalent optometrists are shown on Table 13, below, and Graph 13, on the following page. These projections indicate that an expanding shortage of optometrists is anticipated through 1985. Specifically, the need for additional optometrists will grow from 33 to 110 from 1980 to 1985. This represents a a 4% shortage in 1980 and one of 13% in 1985. It should be noted, however, that with the Department's pending implementation of an optometric contract program for New Jersey residents, the projected 1985 shortage should be reduced.

TABLE 13

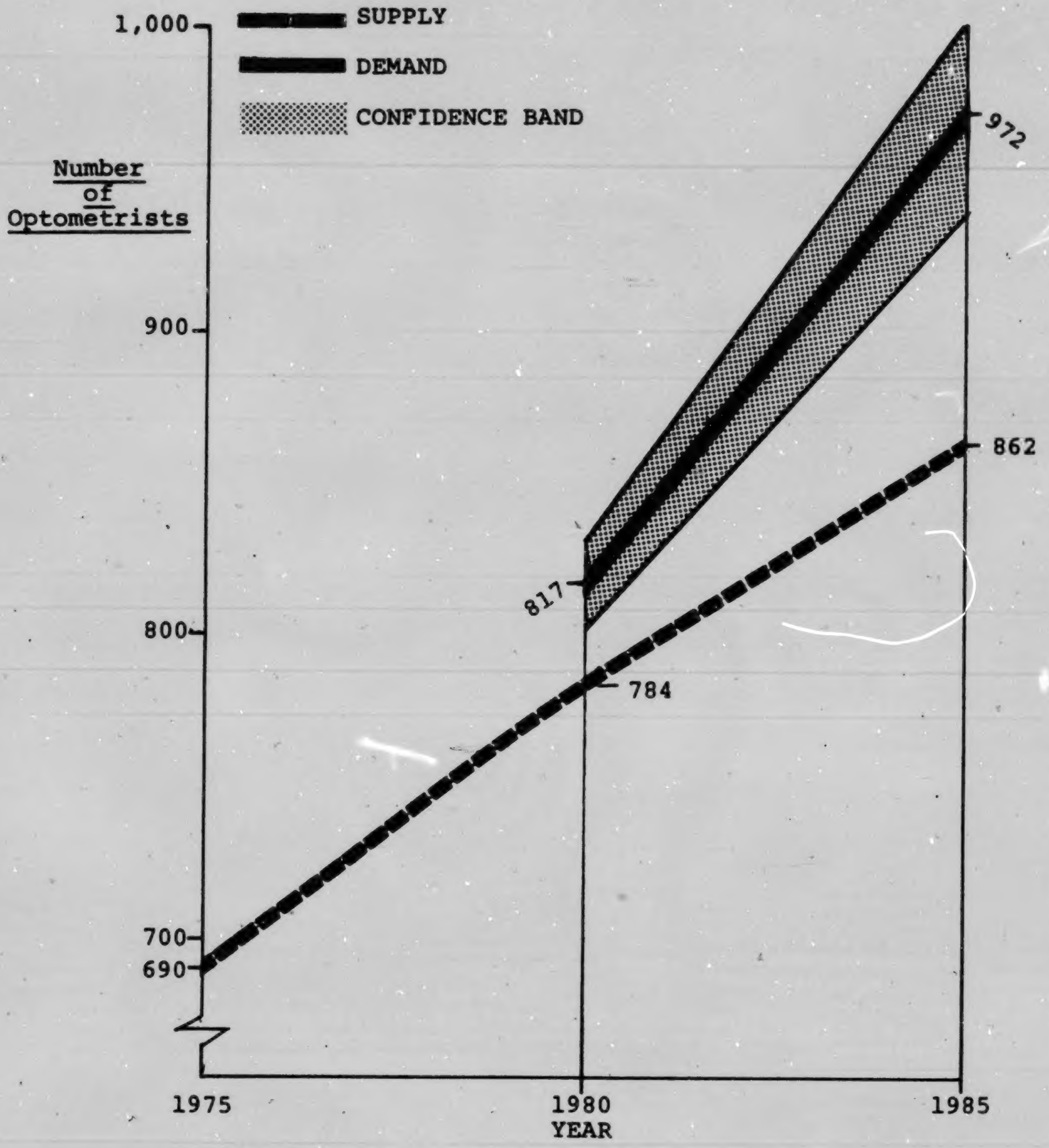
Supply, Demand and Need for Full-time Equivalent Optometrists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	690	-	-
1980	784	817 ± 14	-33
1985	862	972 ± 29	-110

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 13

Supply and Demand for Full-time Equivalent Optometrists in New Jersey 1975-1985



E. Pharmacists

The projection model used for pharmacists is based on the distribution of physicians as they are the source of most prescriptions. As noted elsewhere, two sets of supply projections are used for physicians. The first calculates the status quo supply of physicians as it would have occurred if the new federal health manpower legislation had not been passed. The second supply projection is based on the anticipated impact of the new legislation on newly licensed physicians. Both sets of physician supply projections are used to determine the potential level of future demand for pharmacists in New Jersey. It should be noted, however, that neither series of projections should be considered independently from the other due to the uncertainty about the future supply of physicians in New Jersey.

Table 14, page 59, and Graph 14, page 60, show the results of the pharmacists projections in a status quo physician supply situation unaffected by federal legislation. As these figures indicate, a substantial growth in demand for pharmacists would result in a 10% shortage of pharmacists by 1985. However, since P.L. 94-484 will greatly affect the future growth in physician supply, the second set of pharmacists projections (Table 15, page 59, and Graph 15, page 61) indicates that there may exist a relative balance between supply and demand by 1985. However, the degree to which the demand for pharmacists is balanced with supply, and no shortage of pharmacists projected in the second set of projections, will depend on what actions are taken by the State to alleviate the 1985 projected physician shortage.

TABLE 14

Status Quo Supply, Demand and Need for Pharmacists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	4,435	-	-
1980	4,540	4,930 ± 55	-390
1985	4,630	5,110 ± 120	-480

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

TABLE 15

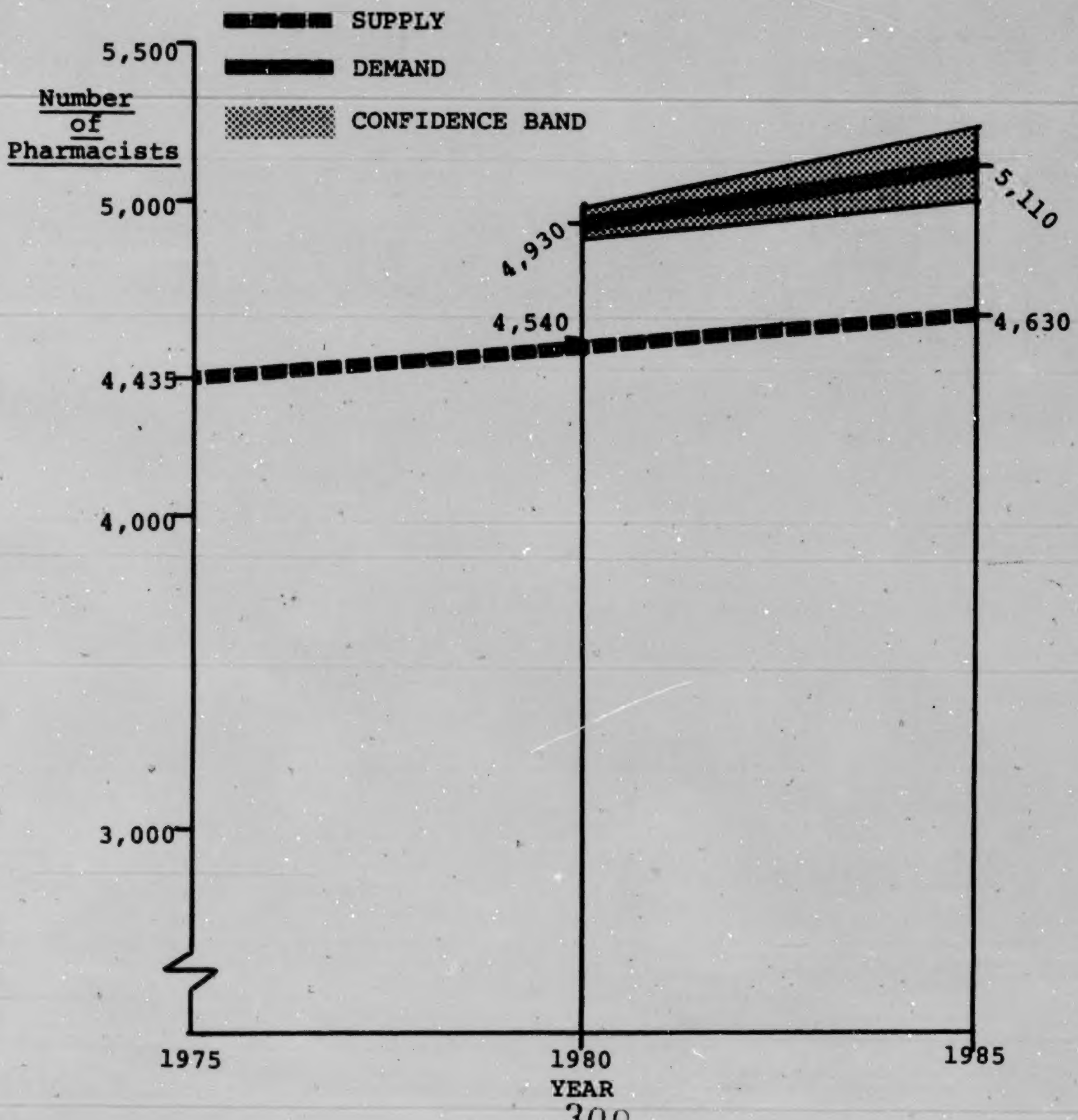
Supply, Demand and Need for Pharmacists Under FMG Restrictions of P.L. 94-484, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	4,435	-	-
1980	4,540	4,930 ± 55	-390
1985	4,630	4,580 ± 110	+50

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

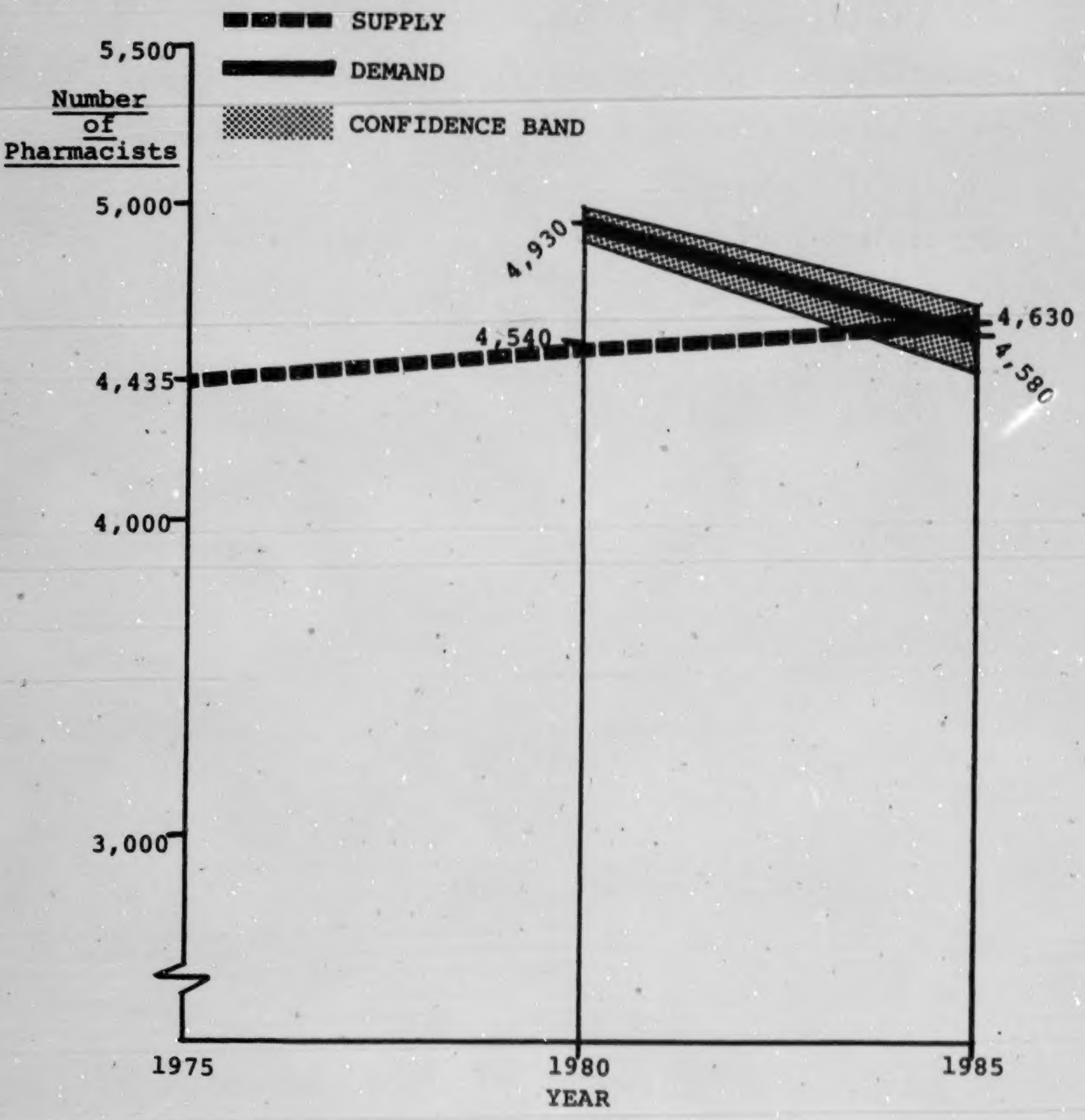
GRAPH 14

Status Quo Supply and Demand for Pharmacists in New Jersey, 1975-1985



GRAPH 15

Supply and Demand for Pharmacists Under FMG Restrictions of P.L. 94-484, 1975-1985



F. Veterinarians

The projections of supply and demand for veterinarians can be found on Table 16, below, and Graph 16, page 64. These projections indicate that a shortage of veterinarians can be expected in both 1980 and 1985. This shortage is expected to grow both absolutely from 69 to 93 veterinarians and proportionately from 8.5% in 1980 to 10% in 1985. However, as the Department's veterinary medicine contract program is now reaching full operation, the State should be able to overcome this projected shortage situation in the near future.

TABLE 16

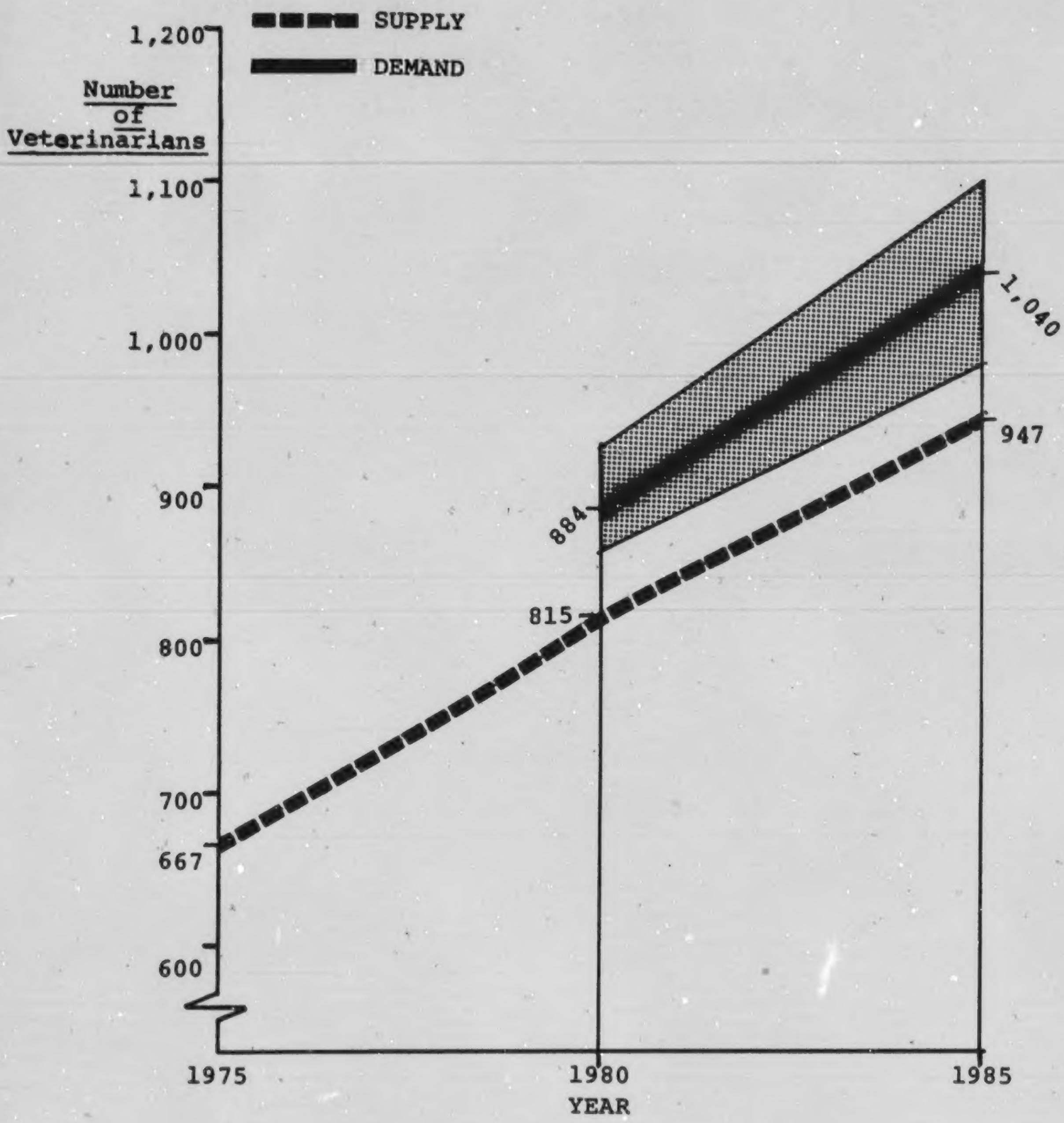
Supply, Demand and Need for Full-time Equivalent Veterinarians in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	667	-	-
1980	815	884 ± 30	-69
1985	947	1,040 ± 60	-93

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 16

Supply and Demand for Full-time Equivalent Veterinarians in New Jersey, 1975-1985



G. Dietetic Personnel

1. Dietitians

The projections of supply and demand for ADA registered, as well as baccalaureate level dietitians are provided in Table 17, below, and Graph 17, page 65. These projections indicate that there will be a very small shortage of dietitians in New Jersey in 1980 and 1985. This finding is similar to the small shortage originally projected in the Health Professions Education Master Plan.

TABLE 17

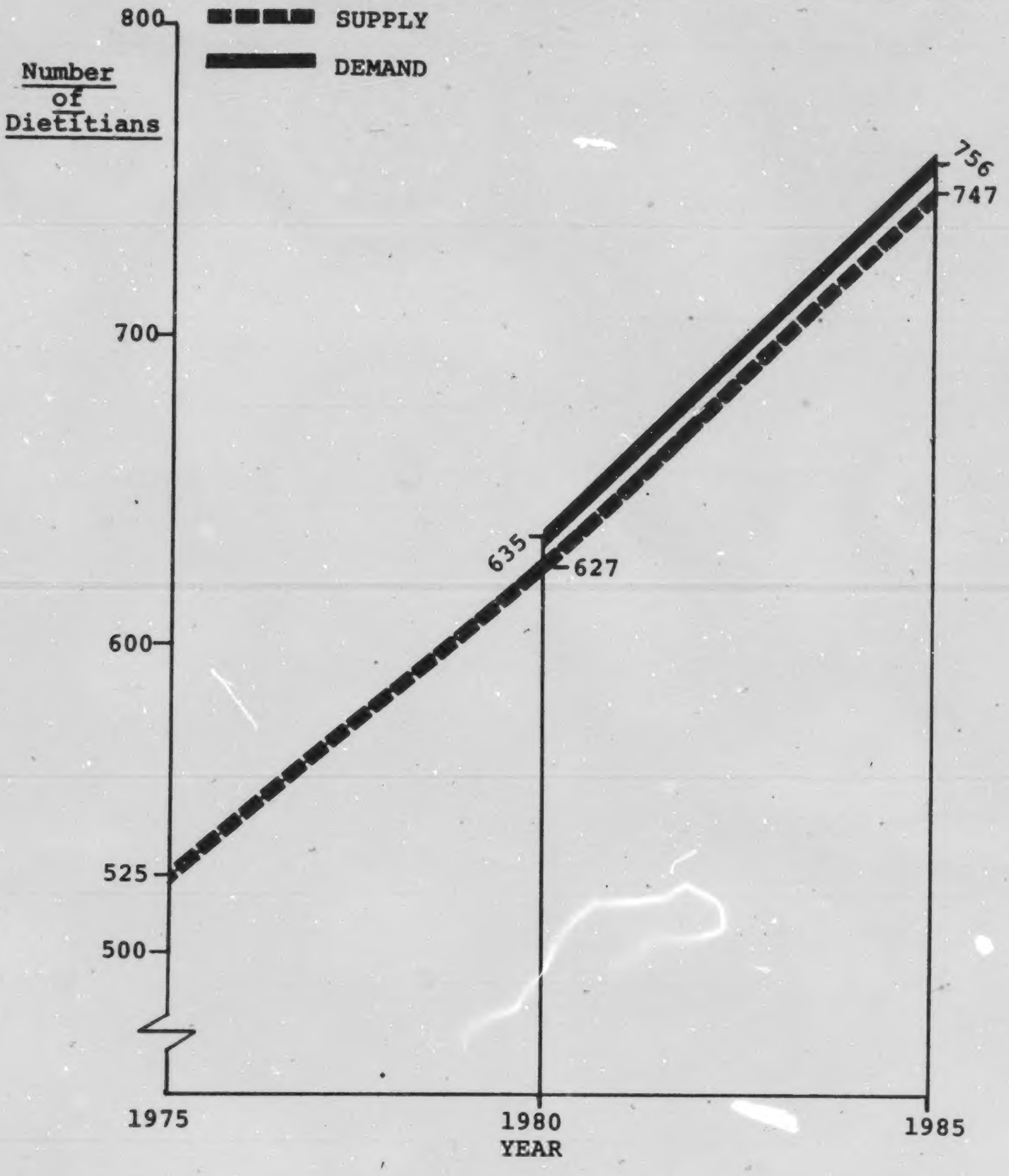
Supply, Demand and Need for Full-time Equivalent Dietitians in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	525	-	-
1980	627	635	-8
1985	747	756	-9

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 17

Supply and Demand for Full-time Equivalent Dietitians in New Jersey, 1975-1985



2. Nutritionists

The area of nutritionist manpower needs in New Jersey has not been addressed in the Department's master planning activities before. The results of the projections of supply and demand for these health professionals are shown on Table 18, below and Graph 18, on the following page. These projections indicate that there will be a small shortage of 4 nutritionists in 1985. This represents a shortage of six per cent of overall supply.

TABLE 18

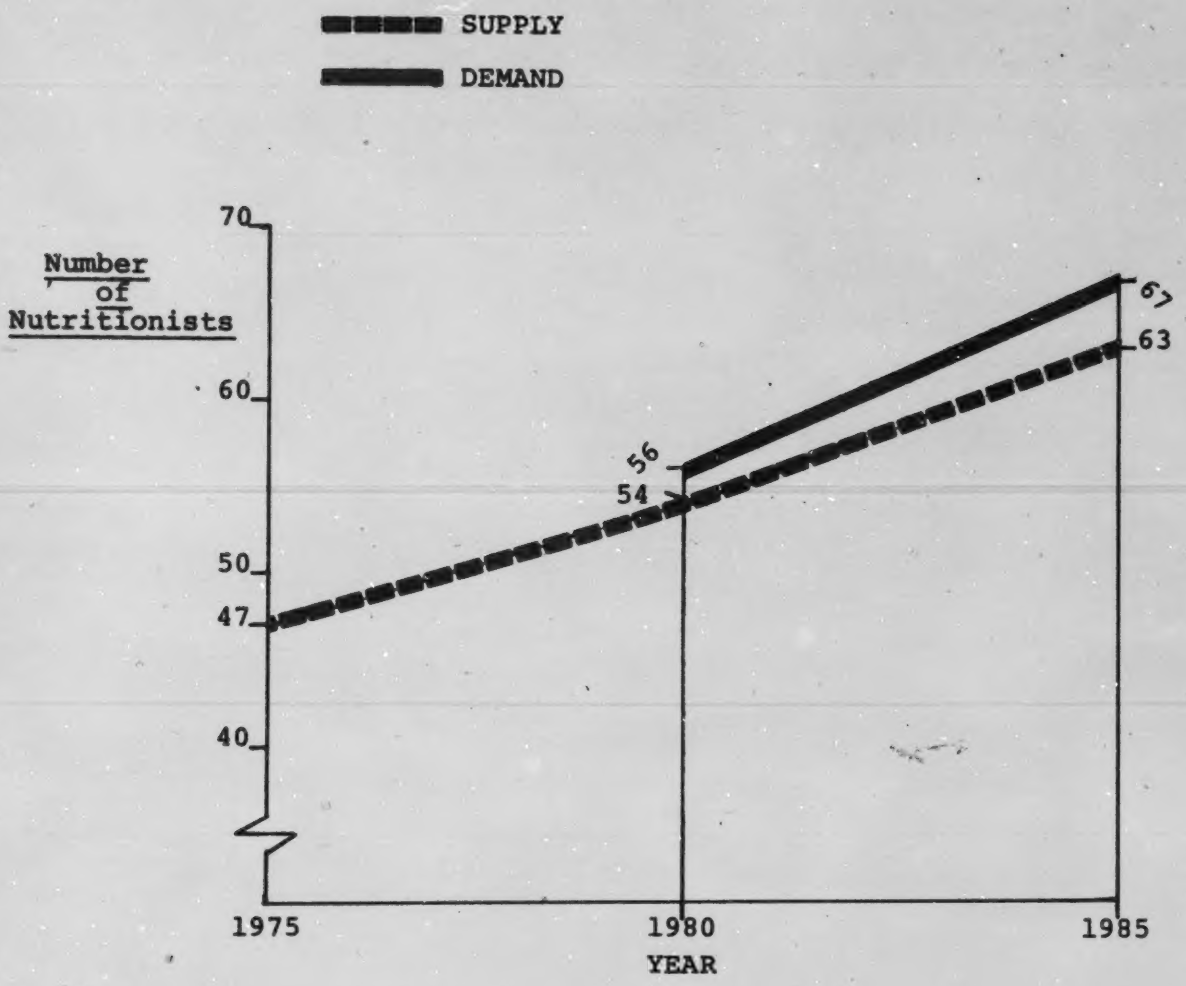
Supply, Demand, and Need for Full-time Equivalent Nutritionists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	47	-	-
1980	54	56	-2
1985	63	67	-4

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 18

Supply and Demand for Full-time Equivalent Nutritionists in New Jersey, 1975-1985



H. Laboratory Personnel

1. Cytotechnologists

The projections of future supply and demand for full-time equivalent cytotechnologists are shown in Table 19, below, and Graph 19, page 69 . Unlike the original projections of the Master Plan, the updated supply and demand figures indicate that a small shortage of these personnel is projected for both 1980 and 1985. The 1985 projected shortage of 19 cytotechnologists amounts to a 12% shortage.

TABLE 19

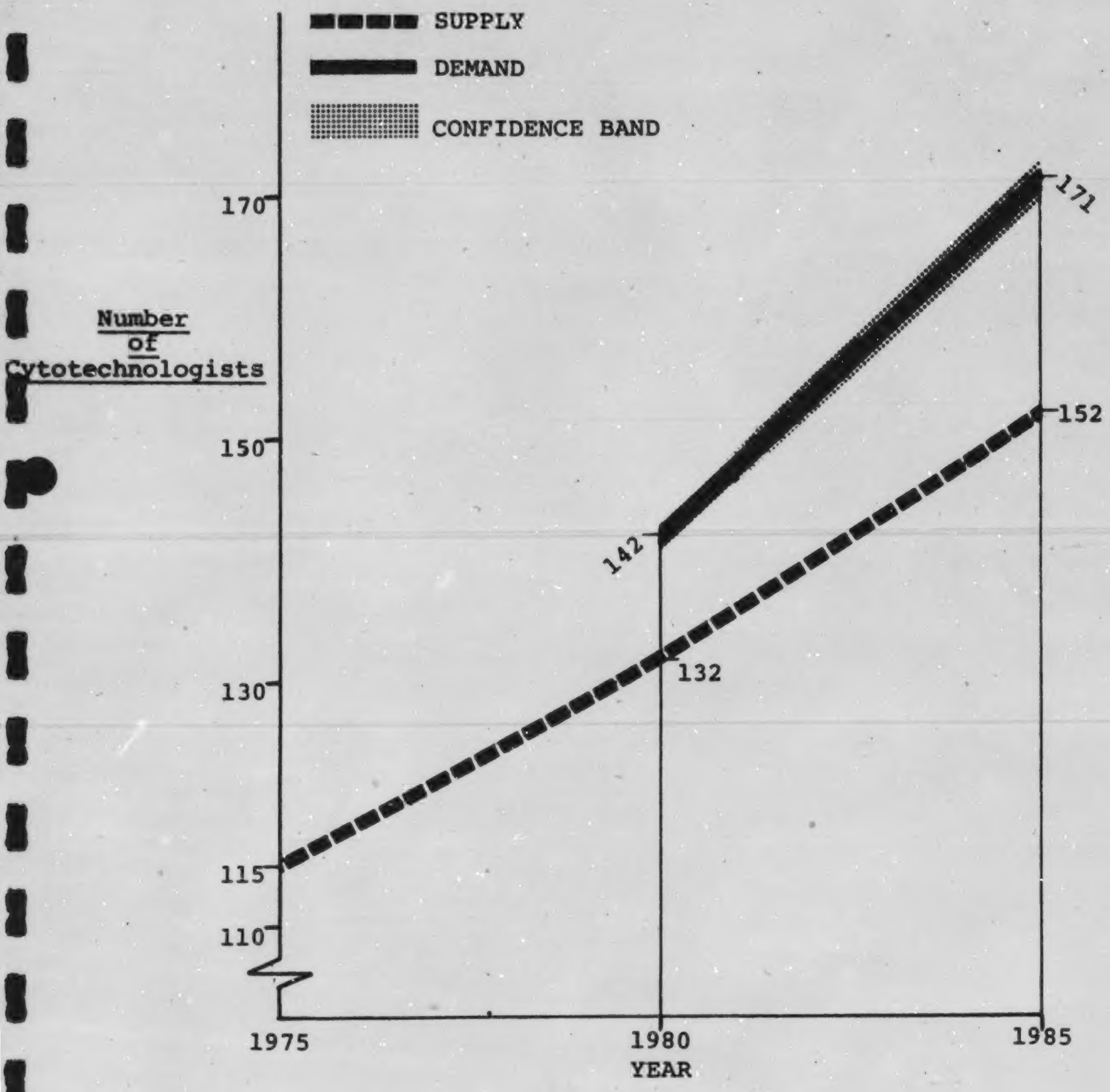
Supply, Demand and Need for Full-time Equivalent Cytotechnologists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	115	-	-
1980	132	142 ± 1	-10
1985	152	171 ± 2	-19

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 19

Supply and Demand for Full-time Equivalent Cytotechnologists in New Jersey, 1975-1985



2. Histologic Technicians

Table 20, below, and Graph 20, on the following page, display the results of the supply and demand projections for histologic technicians. These figures indicate that a 10% shortage, or 12 histologic technicians, is anticipated in 1980. By 1985, the need for additional histologic technicians will expand to 18%, or 23 technicians.

TABLE 20

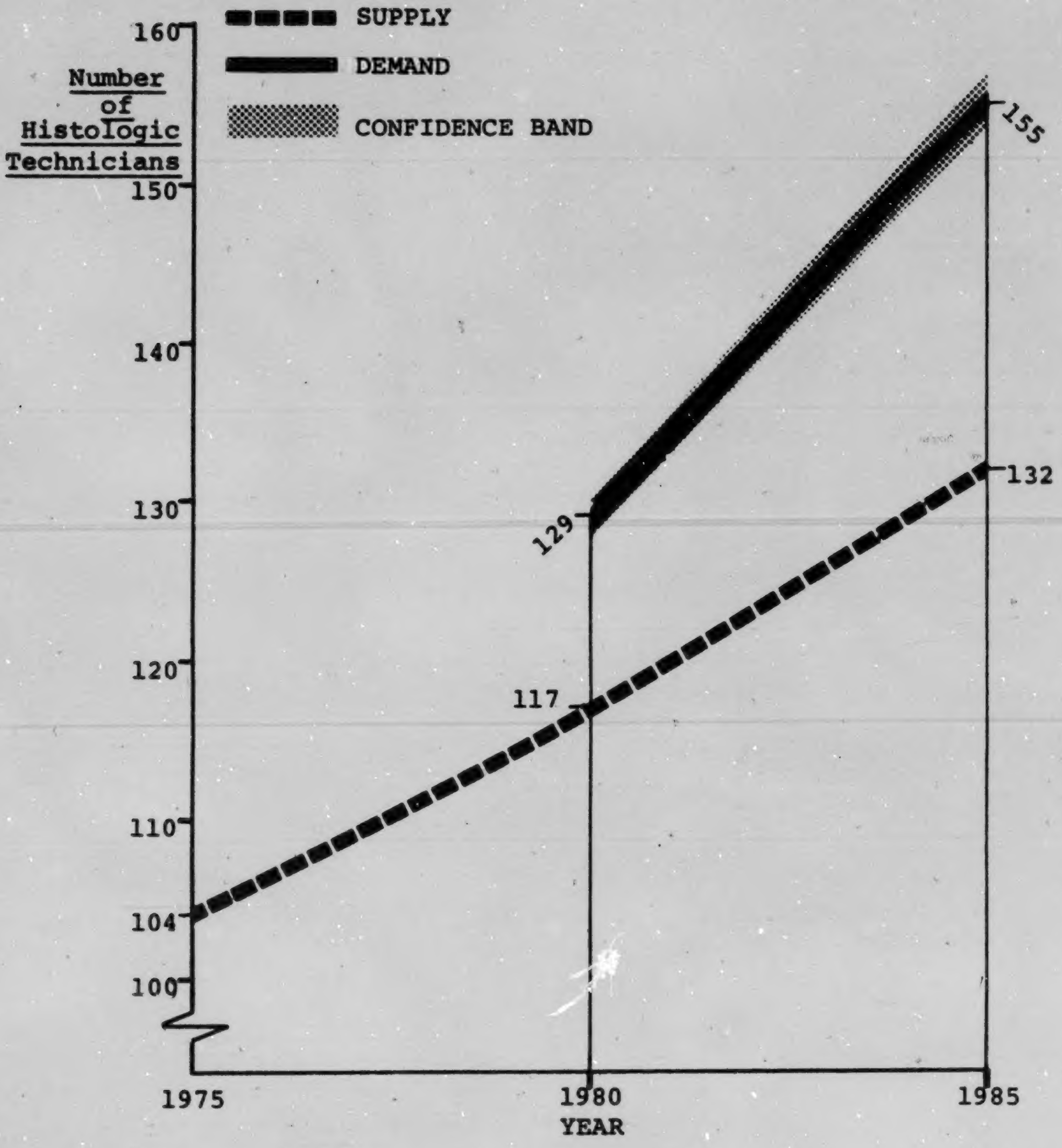
Supply, Demand and Need for Full-time Equivalent Histologic Technicians in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	104	-	-
1980	117	129 ± 1	-12
1985	132	155 ± 2	-23

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 20

Supply and Demand for Full-time Equivalent Histologic Technicians 1975-1985



3. Medical Technologists

Table 21, below, and Graph 21, on the following page provide the results of the projections of supply and demand for medical technologists. These data are concerned with credentialed medical technologists only (either RMT (ASMT) or MT (ACSP)). The projections indicate a relative balance between supply and demand, with a small 2% shortage projected for 1985.

TABLE (21)

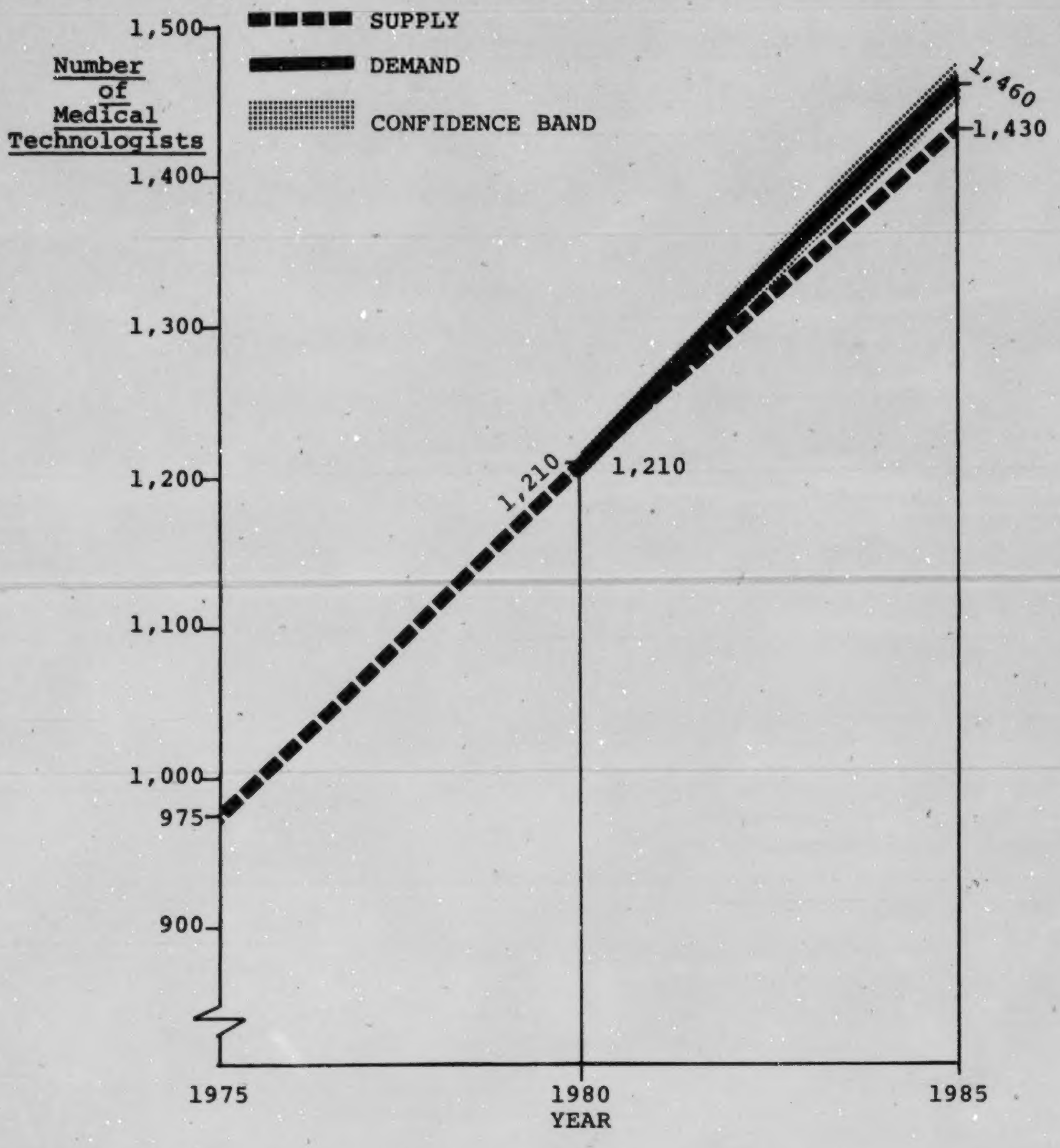
Supply, Demand and Need for Full-time Equivalent Certified Medical Technologists 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	975	-	-
1980	1,210	1,210 ± 6	0
1985	1,430	1,460 ±11	-30

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 21

Supply and Demand for Full-time Equivalent Certified Medical Technologists 1975-1985



4. Medical Laboratory Technician

There was no quantitative assessment of the need for medical laboratory technicians in New Jersey in the Master Plan. The projections presented in Table 22, below and Graph 22, on the next page, are the first projections released by the Department for these professionals. Due to the large proportion of medical laboratory technician educational programs in New Jersey which are not AMA accredited (50%), these projections include both certified and non-certified laboratory technicians. These projections indicate that a growing surplus of laboratory technicians is expected through 1985. Specifically, a 10% surplus, or 150 technicians, is anticipated.

TABLE 22

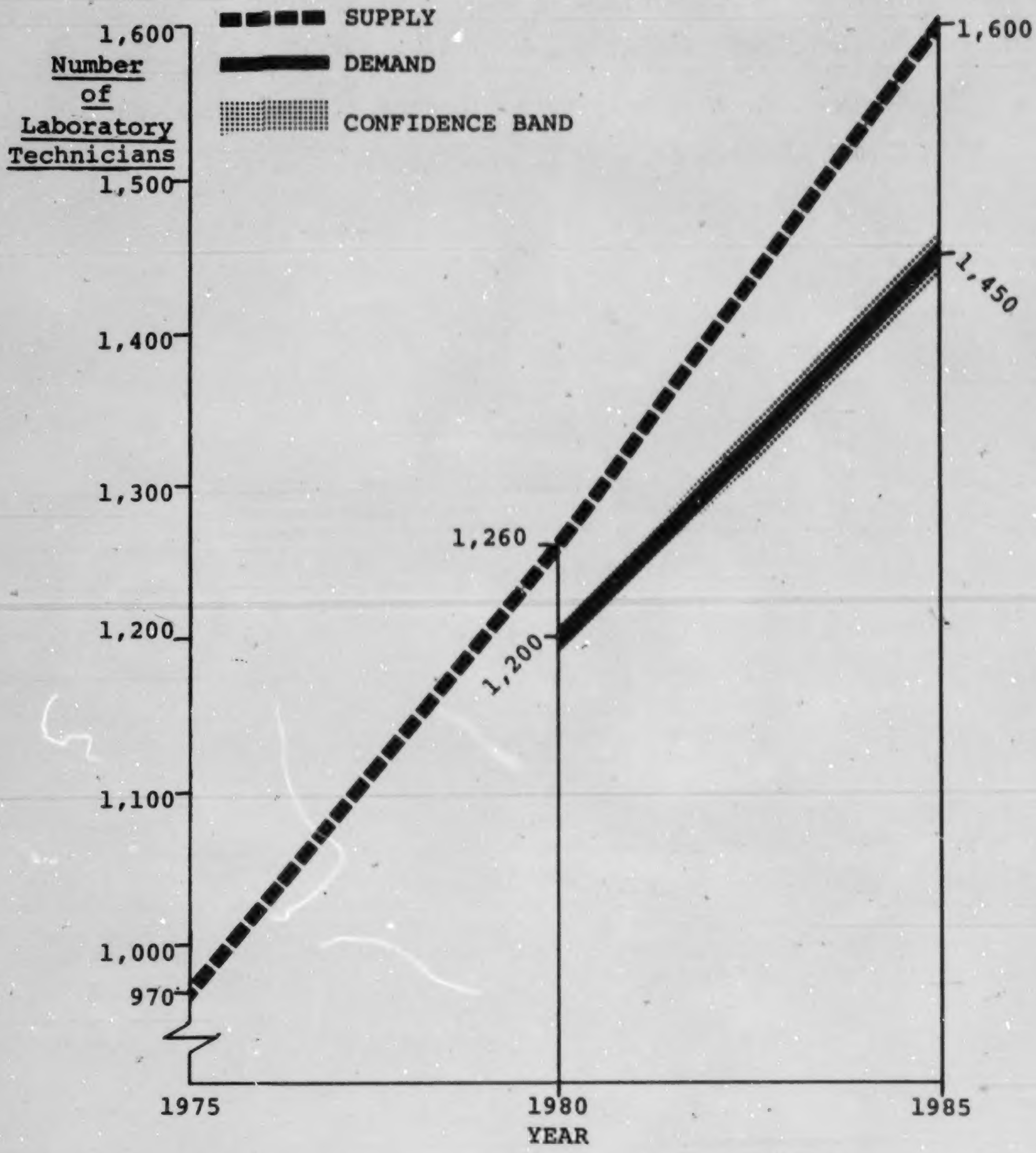
Supply, Demand and Need for Full-time Equivalent Medical Laboratory Technicians in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	970	-	-
1980	1,260	1,200 ± 6	+60
1985	1,600	1,450 ±11	+150

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 22

Supply and Demand for Full-time Equivalent Medical Laboratory Technician, 1975-1985



5. Medical Laboratory Assistants

The projections of supply and demand for certified laboratory assistants are shown in Table 23, below, and Graph 23, on the following page. These projections indicate a growing shortage of these personnel. In 1980, a 10% shortage, or 40 certified assistants, is expected, while in 1985 this shortage will grow to 83, or 18%.

TABLE 23

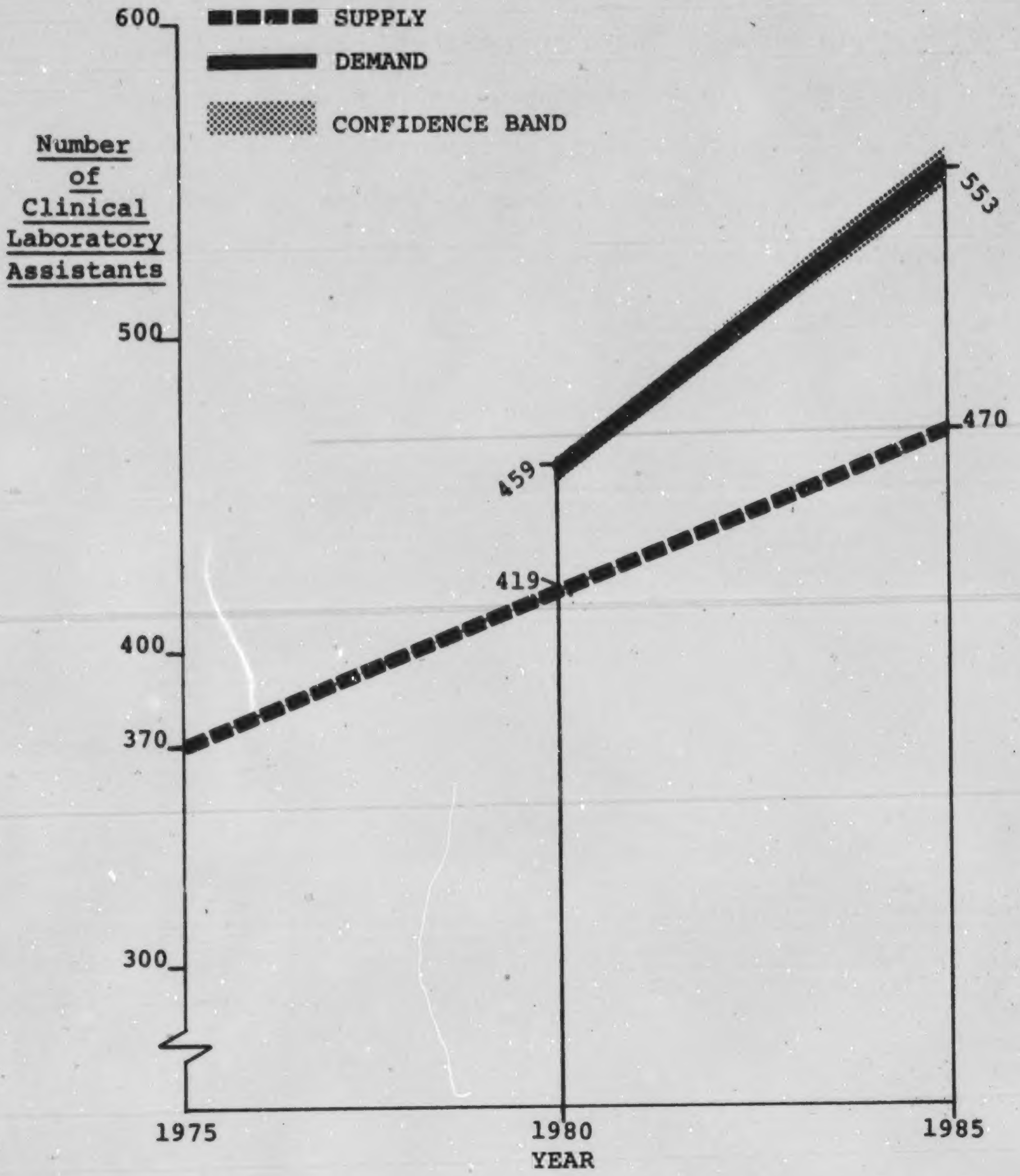
Supply, Demand and Need for Full-time Equivalent Certified Laboratory Assistants in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	370	-	-
1980	419	459 ±2	-40
1985	470	553 ±4	-83

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 23

Supply and Demand for Full-time Equivalent Certified Laboratory Assistants in New Jersey, 1975-1985



I. Medical Records Personnel

1. Medical Records Administrators

Table 24 , below, and Graph 24 , page 79, show the results of the projections for certified medical records administrators. These projections indicate a growing shortage of these personnel. In 1980, a 6% shortage, or eight administrators, is expected. By 1985, this shortage will grow to 19 administrators, or 13%. The Master Plan projected a similar shortage situation.

TABLE 24

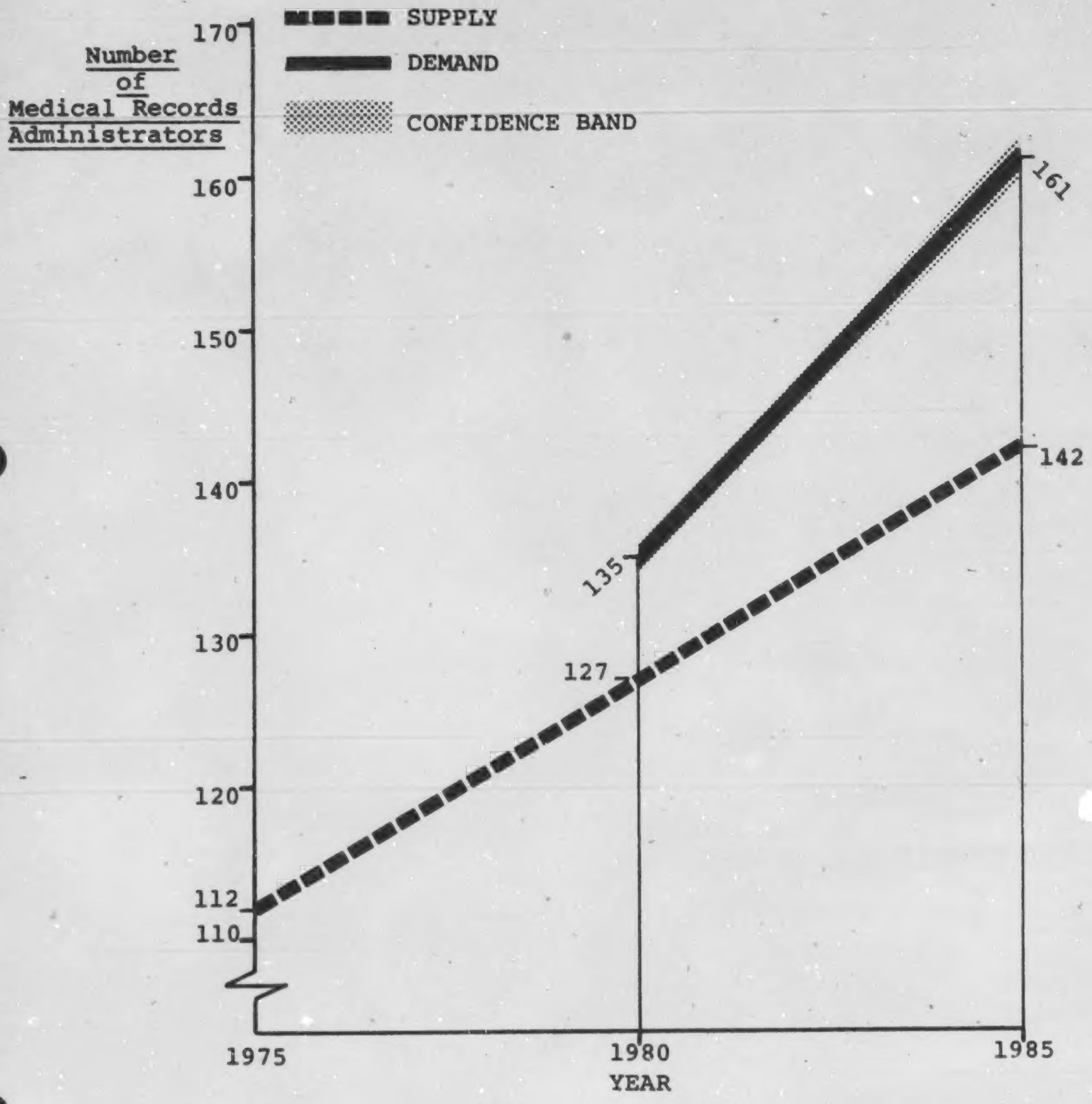
Supply, Demand and Need for Full-time Equivalent Medical Records Administrators in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	112	-	-
1980	127	135 ±1	-8
1985	142	161 ±2	-19

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 24

Supply and Demand for Full-time Equivalent Medical Records Administrators in New Jersey, 1975-1985



2. Medical Records Technicians

The projections of supply and demand for accredited records technicians are shown in Table 25, below and Graph 25, on the next page. These data show that an expanding surplus of records technicians is anticipated. In 1980, an eight per cent surplus of 18 technicians is projected, and in 1985 this surplus will grow to 52 records technicians. The 1985 surplus represents twenty-five per cent of the projected supply. It should be noted that these projections are made for hospital-based accredited technicians. With increasing demand for record keeping in other health institutions, the demand for these personnel may be greater than that shown below.

TABLE 25

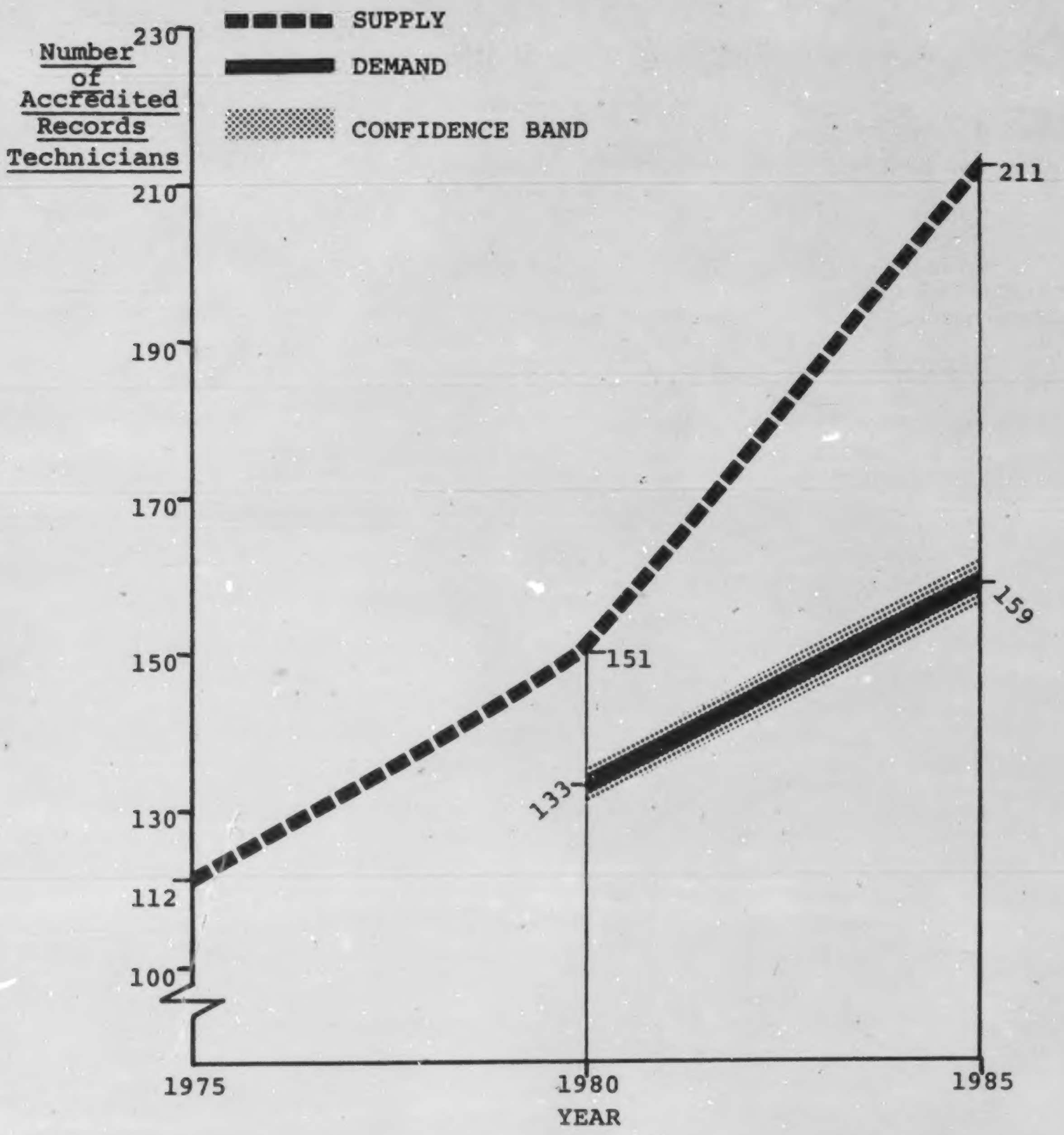
Supply, Demand and Need for Full-time Equivalent Accredited Records Technicians in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	110	-	-
1980	151	133 ±1	+18
1985	211	159 ±2	+52

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 25

Supply and Demand for Full-time Equivalent Accredited Records Technicians in New Jersey, 1975-1985



J. Radiologic Personnel

1. Radiologic Technicians

The Master Plan projected a continuing shortage of radiologic (x-ray) technicians through 1985. These projections were made for all four categories of licensed technicians. These included general licenses, chest licenses, therapy licenses and dental licenses. Since the projections were developed (1972), there has been a substantial growth in the number of x-ray technicians licensed by the State, especially those holding general licenses. The new projections outlined below in Table 26 and in Graph 26, on the following page, are concerned with general x-ray licentiates only. Due to a steady growth in supply, an 11% surplus, or 590 technicians, is projected for 1980. In 1985, this surplus is expected to grow to 1,010 technicians, or 14% of projected supply.

TABLE 26

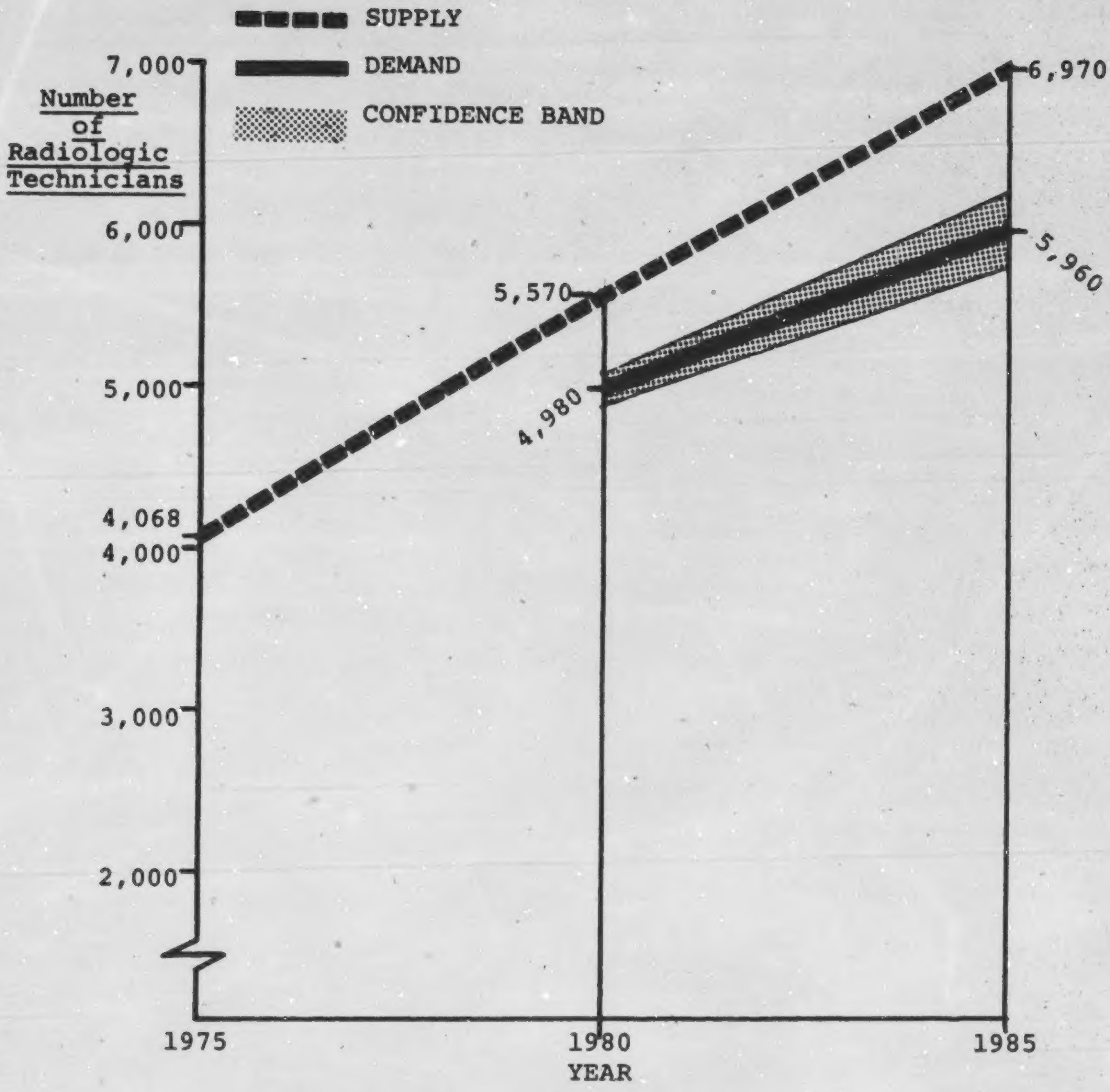
Supply, Demand and Need for Radiologic Technicians in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	4,068	-	-
1980	5,570	4,980 ± 110	+590
1985	6,970	5,960 ± 240	+1,010

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 26

Supply and Demand for Radiologic Technicians in New Jersey, 1975-1985



2. Nuclear Medicine Technologists

The area of nuclear medicine was not addressed in the Master Plan. The data shown below in Table 27 and on the next page in Graph 27 are the results of the projections of supply and demand for nuclear medicine technologists. These data include both ASCP certified nuclear medicine technologists and radiologic technicians working in nuclear medicine. The projections indicate that a shortage of these personnel will continue through 1985. In 1980 there is a projected 7% surplus, or 28 technologists. This will expand to 19% for a surplus of 51 technologists in 1985. It should be noted that these projections concern baccalaureate level nuclear medicine technologists. In the near future, the Department of Environmental Protection will be licensing nuclear medicine technologists who graduate from approved two-year programs.

TABLE 27

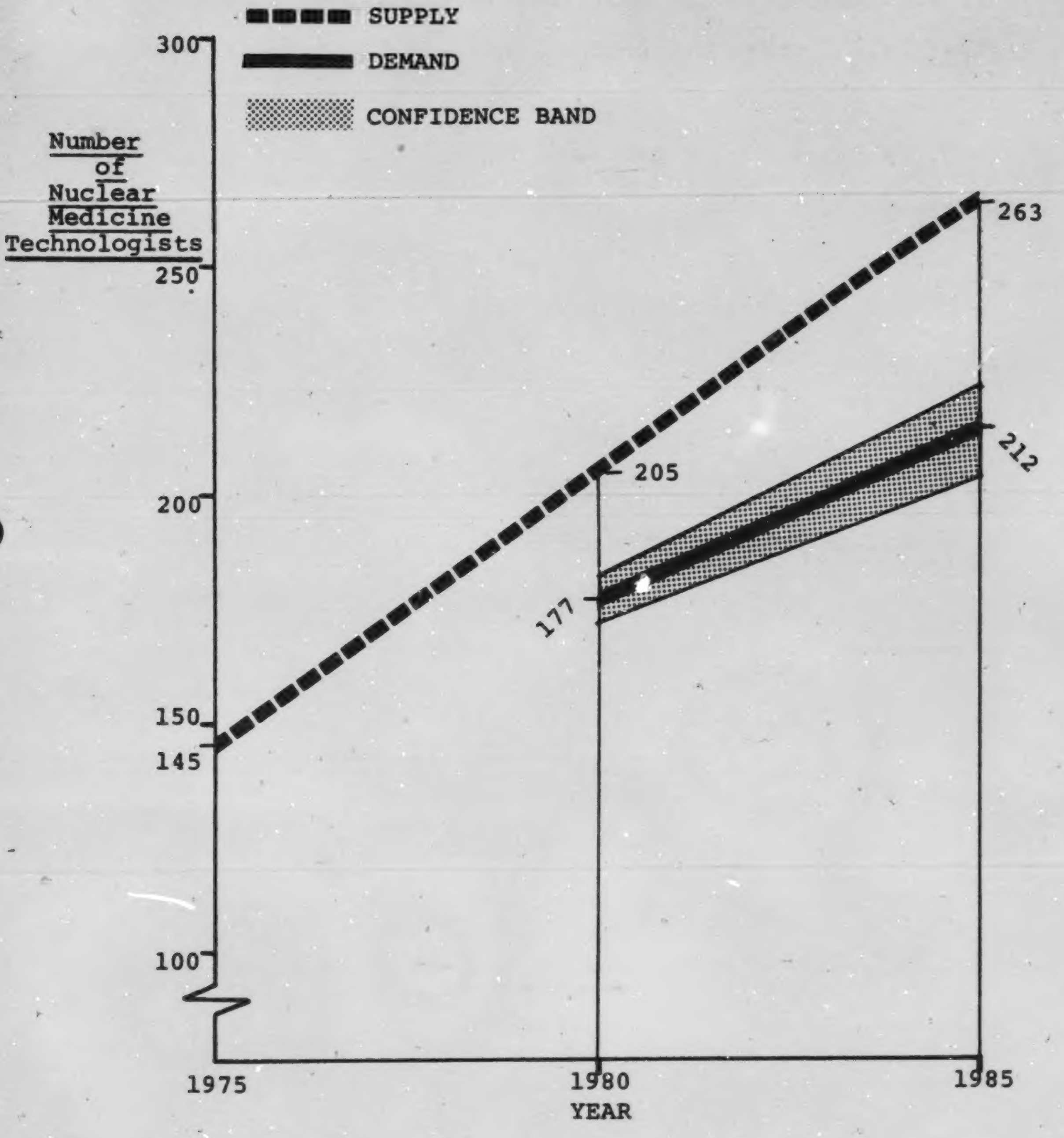
Supply, Demand and Need for Full-Time Equivalent Nuclear Medicine Technologists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	145	-	-
1980	205	177 ± 4	+28
1985	263	212 ± 9	+51

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 27

Supply and Demand for Full-time Equivalent Nuclear Medicine Technologists, 1975-1985



K. Therapeutic Personnel

1. Occupational Therapists

Table 28, below, and Graph 28, on the following page, provide the projection results for registered occupational therapists. These projections indicate that a decreasing shortage of occupational therapists is anticipated through 1985. This improving manpower situation is a result of the positive effect that the new Kean College program will have on supply. In 1980, a 24% shortage, or 60 therapists, is projected, while in 1985, this will decrease to a shortage of 49 occupational therapists, or 13%.

TABLE 28

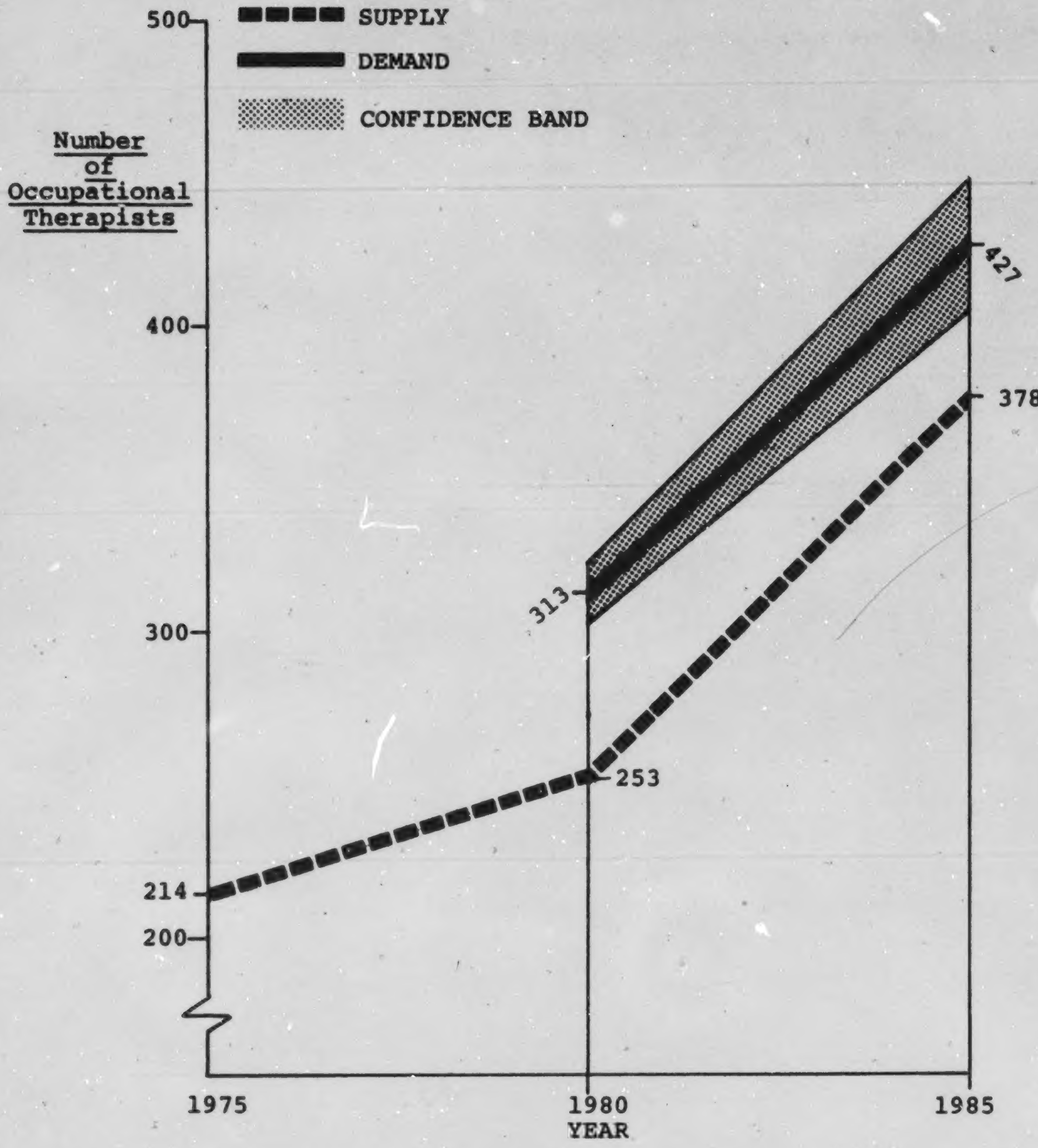
Supply, Demand and Need for Full-time Equivalent Registered Occupational Therapists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	214	-	-
1980	253	313 ± 10	-60
1985	378	427 ± 21	-49

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 28

Supply and Demand for Full-time Equivalent Registered Occupational Therapists in New Jersey, 1975-1985



2. Occupational Therapy Assistants

The results of the projections of supply and demand for certified occupational therapy assistants are shown below in Table 29, and on Graph 29 (page 89). As is the case with occupational therapists, shortages of certified assistants are anticipated in both 1980 and 1985. The shortage of 18 assistants expected in 1980 represents 9% of the 1980 projected supply. While this shortage is expected to increase absolutely to 23 assistants in 1985, it will be proportionately reduced to 8% of projected supply.

TABLE 29

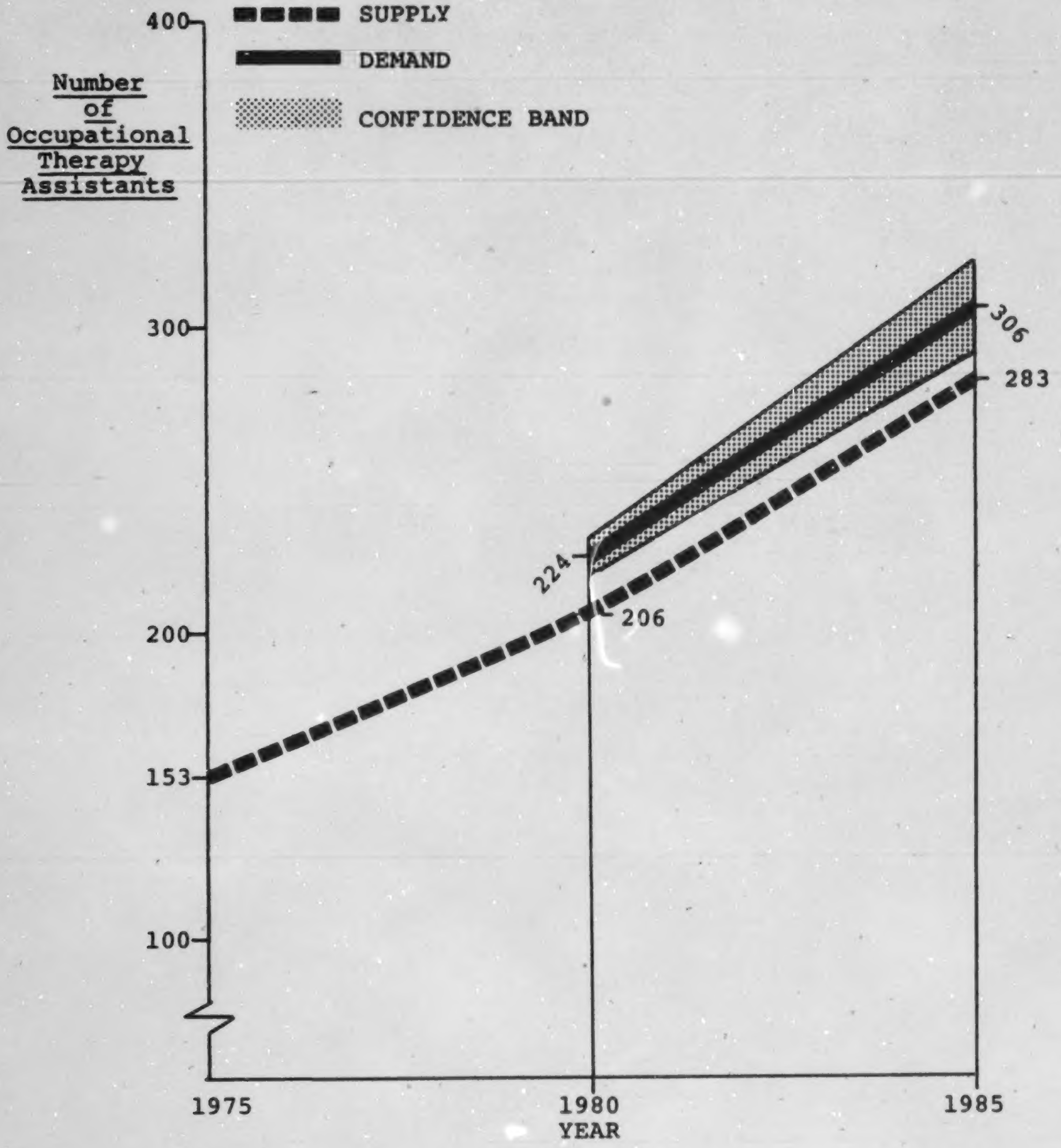
Supply, Demand and Need for Full-time Equivalent Certified Occupational Therapy Assistants in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	153	-	-
1980	206	224 ± 7	-18
1985	283	306 ± 15	-23

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 29

Supply and Demand for Full-time Equivalent Certified Occupational Therapy Assistants in New Jersey, 1975-1985



3. Physical Therapists

The projections of supply and demand for full-time equivalent physical therapists are shown in Table 30, below, and on the following page, Graph 30. These data indicate that a continuing shortage of these professionals can be anticipated in the future. This shortage is projected to grow from 36 (4%) in 1980 to 110 therapists (11%) by 1985. This increasing shortage is caused by the future effect of National Health Insurance on the demand for physical therapists. This shortage will begin to be confronted with the graduation of physical therapists from the Kean College-C.M.D.N.J. program.

TABLE 30

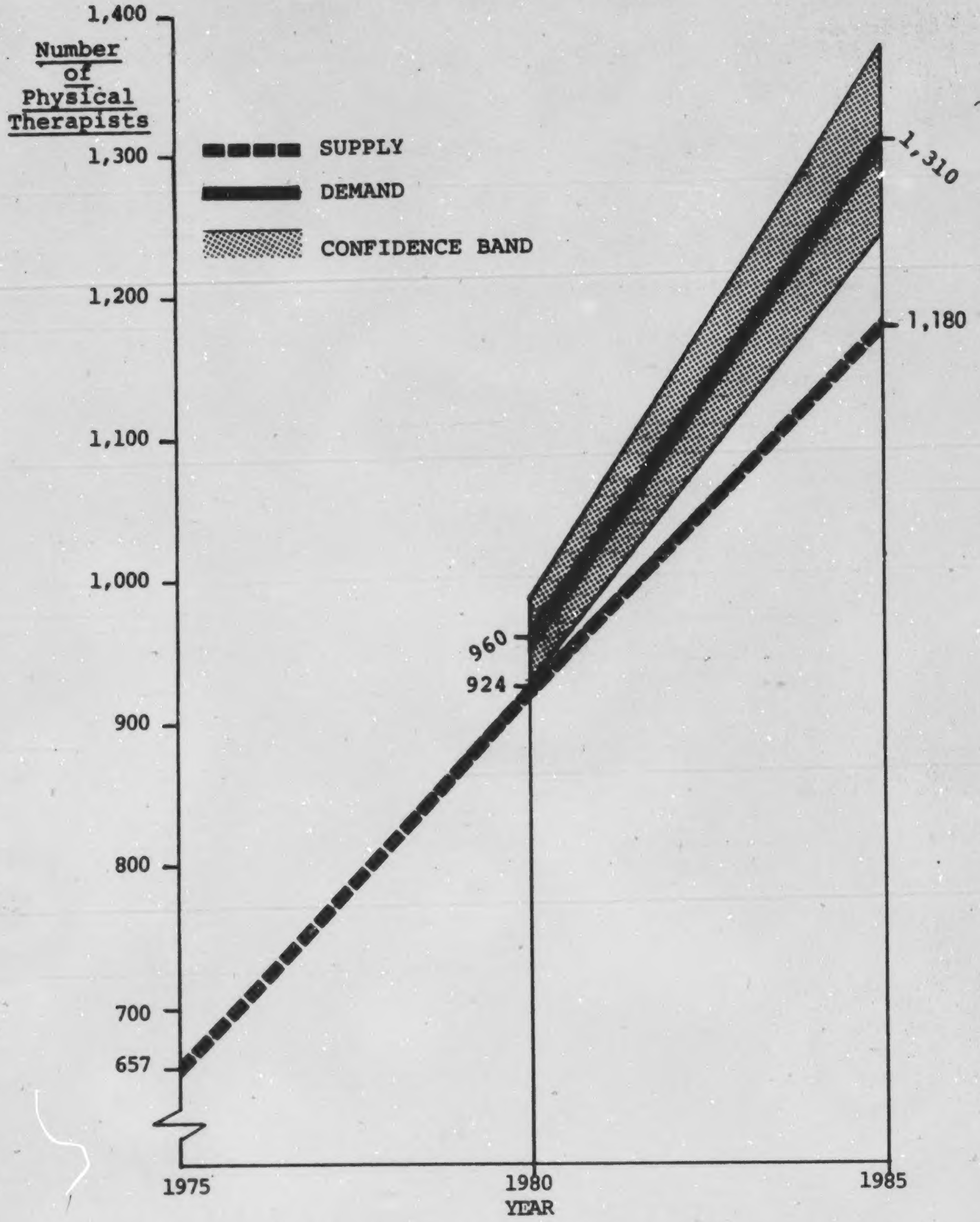
Supply, Demand and Need for Full-time Equivalent Physical Therapists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	657	-	-
1980	924	960 ± 30	-36
1985	1,180	1,310 ± 65	-130

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 30

Supply and Demand for Full-time Equivalent Physical Therapists in New Jersey, 1975-1985



4. Respiratory Therapists

The projections of supply and demand for registered respiratory therapists are shown in Table 31, below, and Graph 31, on the next page. These data indicate that supply will grow more rapidly than demand over the next decade. In 1980, a surplus of 39 therapists is projected. This surplus will grow to a level of 92 therapists, or well over 30% by 1985. This finding of a large impending surplus of these personnel agrees with the projections originally made in the Master Plan.

TABLE 31

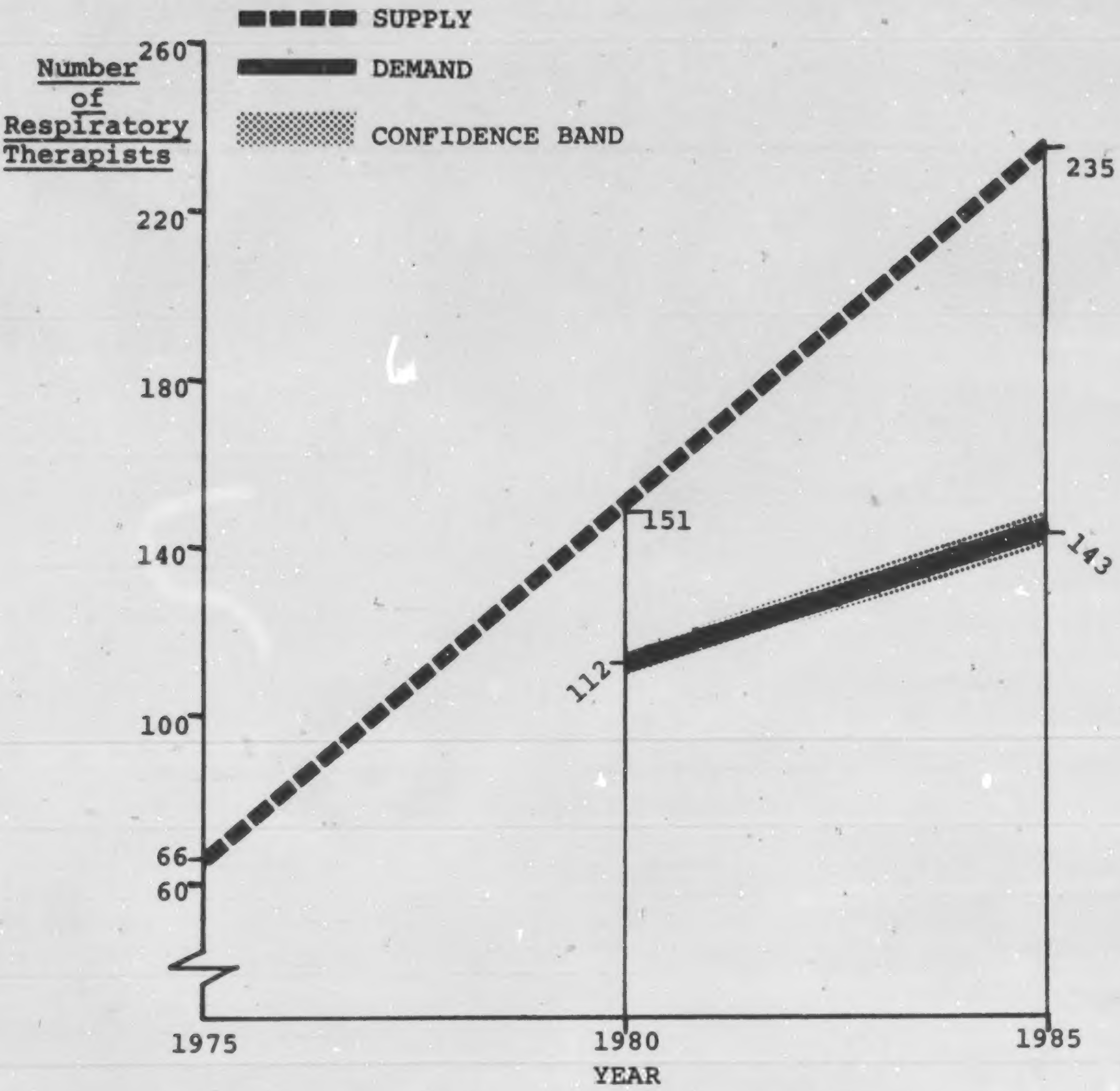
Supply, Demand and Need for Full-time Equivalent Registered Respiratory Therapists in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	66	-	-
1980	151	112 ±1	+39
1985	235	143 ±3	+92

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 31

Supply and Demand for Full-time Equivalent Registered Respiratory Therapists in New Jersey, 1975-1985



5. Respiratory Therapy Technicians

The projections of supply and demand for certified respiratory therapy technicians indicate an expanding surplus for the future. The 1980 projected surplus equals 41 technicians, which represents 9% of the 1980 projected supply. In 1985, this surplus will grow to 89 technicians, or 14%. These data are shown in Table 32, below, and Graph 32, on the following page.

TABLE 32

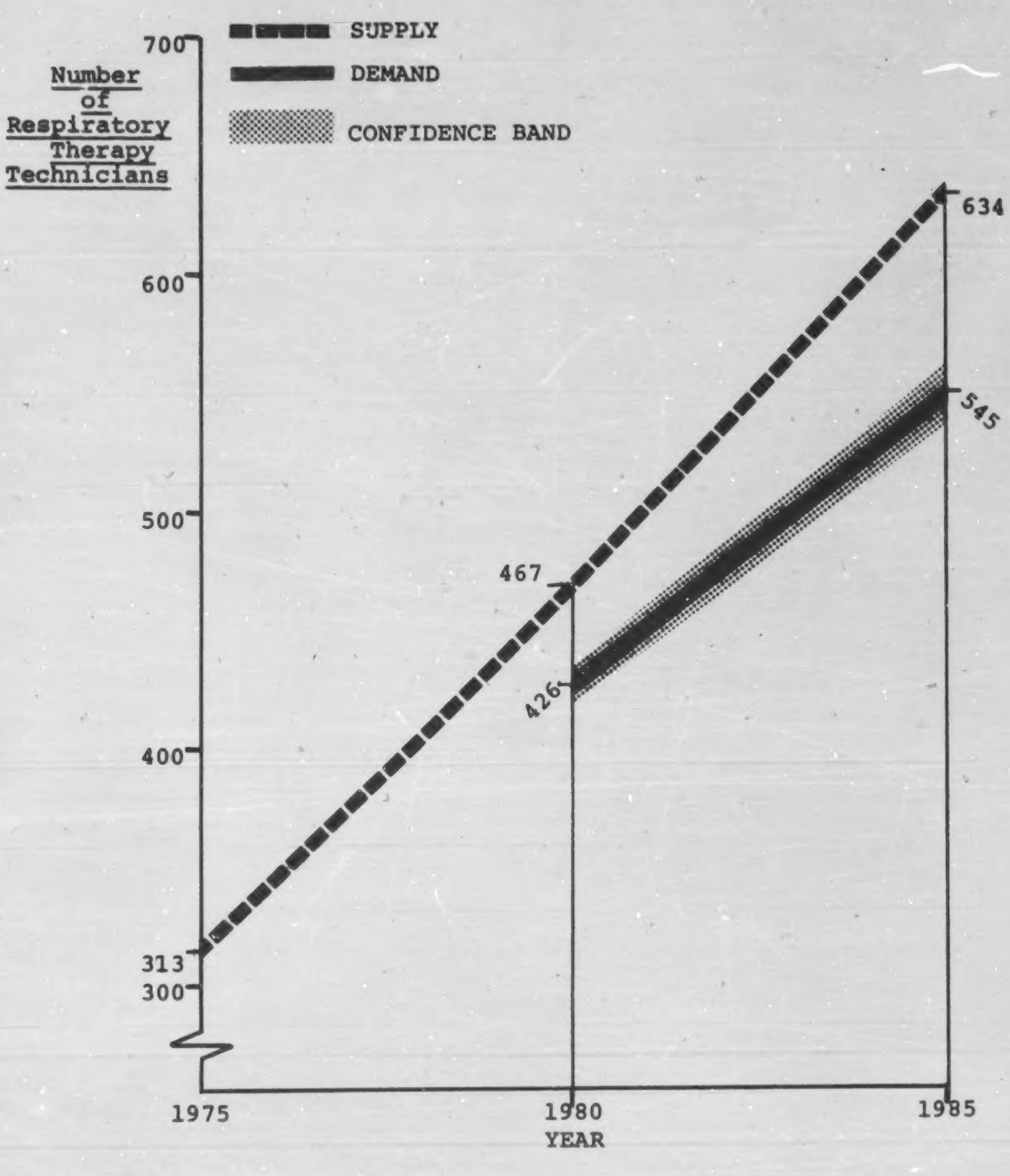
Supply, Demand and Need for Full-time Equivalent Certified Respiratory Therapy Technicians in New Jersey, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	313	-	-
1980	467	426 ± 3	+41
1985	634	545 ± 8	+89

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 32

Supply and Demand for Full-time Equivalent Certified Respiratory Therapy Assistants in New Jersey 1975-1985



6. Speech Pathologists/Audiologists

The Master Plan projected a continuing shortage of speech pathologists/audiologists through 1985. However, declining public school enrollments are reducing the future demand for these personnel. In Table 33, below, and Graph 33, on the following page, the results of updated projections of supply and demand for master's level speech pathologists/audiologists are presented. These projections indicate that a surplus of these professionals is anticipated. The 1980 surplus will amount to 45 speech pathologists and audiologists (5%). This surplus will grow to 55 professionals by 1985, which is also 5% of the 1985 speech pathologist and audiologist workforce.

TABLE 33

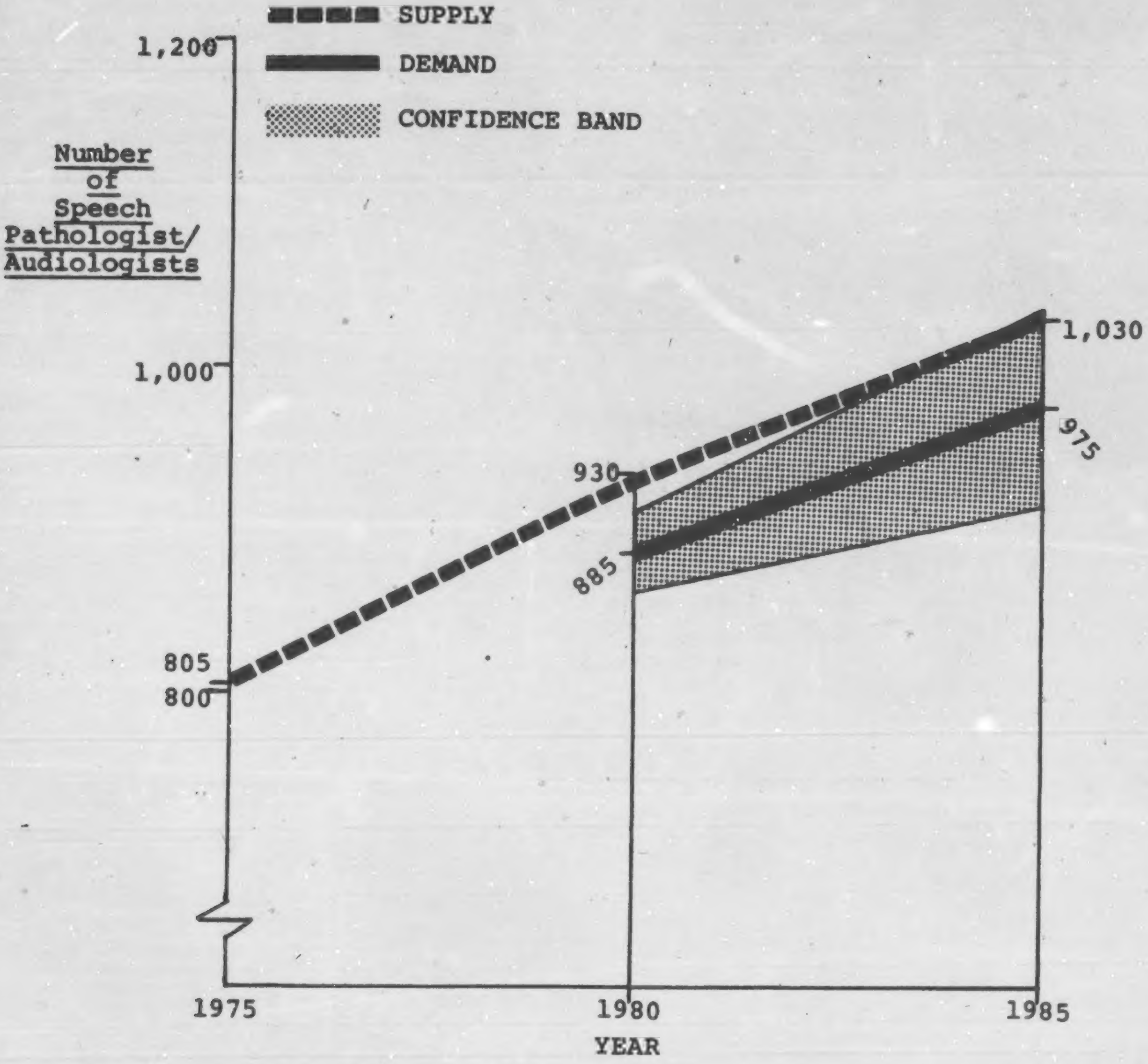
Supply, Demand and Need for Full-time Equivalent Masters Level Speech Pathologists/Audiologists, 1975-1985

Year	Supply	Projected Demand	Manpower Need*
1975	805	-	-
1980	930	885 ± 25	+25
1985	1,030	975 ± 60	+55

*Manpower Need is taken at the midpoint of demand and calculated as Supply-Demand. Therefore, a negative sign (-) denotes a shortage of personnel.

GRAPH 33

Supply and Demand for Full-time Equivalent Masters Level Speech Pathologists/Audiologists, 1975-1985



Appendix A:

Definition of Permanent Income

In the development of the projections presented in the body of this report, a new income variable is introduced. Current per capita income is replaced by a measure of permanent income. As defined by Milton Friedman in A Theory of the Consumption Function (Princeton University Press, 1957), permanent income is an index of wealth, where wealth includes human capacity as well as the non-human assets ordinarily designated by that term. Friedman's permanent income hypothesis assumes that the consumer has, at any monent in time, some estimate of wealth and adjusts his flow of consumption to this estimate. More precisely, the prime determinant of an individual's yearly level of consumption is the annualized discounted flow of funds generated by the stock of human (education, health) and non-human (stocks, bonds, etc.) wealth.

For the purpose of manpower planning, we are interested in the long run relationship between income and the demand for health care and health manpower. Therefore, the use of permanent income is most appropriate. Since permanent income is based upon wealth, it is independent of temporary changes in income due to windfall losses or gains which may be irrelevant for spending decisions. For example, if a person were to win at a race track, that gain would become part of that individual's income. If we were then to examine the relationship between this person's consumption and current income, the resulting statistical parameter would be biased since it overestimates the impact of this one time gain. We believe that the addition of the permanent income concept should result in more stable and significant relationships between the demand for health care and income.

In order to measure the relationship between demand and income it is necessary to make the income variable more specific. The standard approach is to estimate permanent income as a weighted average of past and present levels of income, i.e.,

a. $Y_p = \lambda_o Y_t + \lambda_1 Y_{t-1} + \lambda_2 Y_{t-2} + \ldots + \lambda_n Y_{t-n}$ where:

Y_p = permanent income

Y_t = disposable income in time period t.

$0 \leq \lambda_i \leq 1$

$\Sigma \lambda_i = 1$

We have assumed that λ_i is a declining exponential function of the following form:

b. $\lambda_i = W_i \quad (1-W_i)^i$ where:

W_i = the assigned annual weights to current income. Friedman suggests that W_i should be set at .33, resulting in a three year time discount period.

Data were collected on per-capita disposable income by county for 1954 to 1974. A computer program was written to successfully weight these income levels in the linear form of the equations given above. These 1974 estimates of county permanent income were then incorporated into our projection model.

Appendix B:

Specifications of the Projection Equations

PHYSICIANS

A. Demand

See page 18 for details.

B. Supply

The physician supply projections are based upon the addition of new licentiates adjusted for in-state retention, and modified for attrition. Two sets of supply projections are presented. In the first, supply is calculated assuming that the factors affecting the annual growth in the State's physician supply will remain essentially unchanged through 1985. The second set of supply projections is built upon assumptions about the effects of the Health Professions Educational Assistance Act of 1976 (P.L. 94-484) which promises to substantially alter the trend in the State's physician supply due to its restrictions on the immigration of foreign medical graduates (FMGs).

Data from the New Jersey Board of Medical Examiners indicate that 1400 new physician licenses are issued annually. By applying in-state retention rates, this number reduces to 932 annual gross additions to the State's physician labor force. This count is further reduced to 897 when it is translated into full-time equivalents. By calculating expected attrition over the projection period, supply projections in a status quo system are developed. These amount to approximately 14,000 in 1980 and 16,000 in 1985. In order to adjust these projections to reflect the impact of the immigration restrictions of P.L. 94-484, it is necessary to determine the proportion of newly licensed physicians who are FMG's. This proportion is estimated at 75% of all new licentiates. By adjusting this figure for those FMG's who are American-born and those who can meet the law's strict immigration requirements, the net effect of this new legislation is estimated at a 48% reduction in newly licensed physicians. Applying this factor to the years following 1981 when the law will be fully implemented, 1985 supply is projected at 14,400 rather than the 16,000 in a status quo system.

Full documentation of these projections is contained in the Department's Health Manpower Planning Series Report Number One, "An Analysis of the Need for Physician in New Jersey 1975-1985" (pp. 13-20).

DENTAL PERSONNEL

A. Dentists

1. Demand

The demand for dentists is calculated using the following equation:

$$\left(\frac{\dot{D}}{Pop}\right)_t = \underset{(4.55)}{1.085}\,\dot{Y}_t + \underset{(3.84)}{1.647}\,\dot{A}_t + \underset{(2.13)}{.2829}\,\dot{V}_{ht} + \dot{I}_t\,\dot{Q}_{ts} \quad \text{where:}$$

$\left(\frac{\dot{D}}{Pop}\right)_t$ = The percentage change in the dentist-to-population ratio resulting from changes in the variables below.

$\dot{Y}_t$ = The percentage change in permanent income to time period t.

$\dot{A}_t$ = The percentage change in the age of the base year population to time period t.

$\dot{V}_{ht}$ = The percentage change in hospital services provided to time period t.

$\dot{I}_t$ = The projected impact of expanded dental insurance coverage on the demand for dentists in time period t (1980-1985).

$\dot{Q}_t$ = An estimate of productivity change in the time period to 1980 and 1985.

The r^2 of this equation equals .793. The effect of increased dental coverage of the demand for dentists is estimated at 4.0% for the period from 1980 to 1985. Dental productivity increases are estimated at 1.6% per year.(1)

2. Supply

The supply of dentists in 1975 was taken from the Department of Health's Health Manpower Information System. The projection of supply was based on annual additions to the licensed dentist pool taken from the Board of Dentistry and annual attrition from the dental workforce due to death and retirement.

B. Dental Auxiliaries

1. Demand

The demand method used for dental auxiliaries (dental assistants, hygienists and laboratory technicians) is explained in the body of the report (page 19). It uses the current state and national ratios of auxiliaries to dentists as the projection base.

2. Supply

The 1975 supply of dental assistants and dental laboratory technicians was taken from the Department of Labor and Industry's Occupational Employment Surveys. Dental hygienist data are developed from the Department of Higher Education's Health Manpower Information System, which is based on licensure survey data. The projection of supply for each profession uses information on the output of New Jersey's educational programs[2] adjusted for the in-state retention of these graduates.[3] These data are used in conjunction with annual attrition data to calculate future supply.

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(1) Paul J. Feldstein, Financing Dental Care: An Economic Analysis (D.C. Heath and Company, Lexington, MA, 1973) pp. 68-83.

NURSES

A. Demand

The nursing equation is as follows:

$$\dot{N}_t = \underset{(21.0)}{.9061}\,\dot{P}_t + \underset{(3.1)}{.8323}\,\dot{Y}_t + \underset{(3.6)}{.4183}\,\dot{V}_{nt} + \underset{(1.7)}{.2285}\,\dot{A}_t + \dot{I}_t - \dot{Q}_{ts}$$ where:

$\dot{N}_t$ = the percentage change in nurses resulting from changes in the independent variables below.

$\dot{P}_t$ = the percentage change in population to time period t.

$\dot{Y}_t$ = the percentage change in permanent income to time period t.

$\dot{V}_{nt}$ = the percentage change in hospital services provided to time period t.

$\dot{I}_t$ = the projected impact of National Health Insurance on the demand for nurses in time period t (1980-1985).

$\dot{Q}_{ts}$ = An estimate of productivity changes in the time period to 1980 and 1985.

The r^2 of this equation is .928. The National Health Insurance impact is estimated at 5.7% for the period from 1980 to 1985. Annual productivity increases are estimated at 1.5% per year.

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(2) Department of Higher Education, An Inventory of Health Professions Education Programs in New Jersey, Health Manpower Planning Series Report Number Two, Trenton, January 1978.

(3) The use of in-state survival ratio for the graduates of New Jersey programs was begun with the Health Professions Education Master Plan. These rates can be found on page 91 of that document.

B. Supply

The baseline supply of registered nurses was taken from the Department of Higher Education's Health Manpower Information System.(4) More recent data on the supply of professional nurses in New Jersey are currently not available. Future supply was calculated using data on new licentiates provided by the Board of Nursing. These data were adjusted for in-state actives and for net increases in nursing program graduates in New Jersey (additional graduates adjusted for "in-state survival"). The effects of the current moratorium on nursing program enrollments were also factored in, with the two-year associate program caps affecting 1979 supply, three-year diploma program caps influencing 1980 supply, and 1981 supply increases influenced by caps on four-year baccalaureate programs. Two sets of nursing supply projections for 1985 are provided. One shows the effect of the continuation of the caps to 1985, while the other indicates the impact of a discontinuation of the policy beginning in 1980. Because of the time required for the increased enrollments to begin to affect the size of the work force, the 1985 impact of ending the enrollment cap policy is not significant. However, a more substantial impact will be evident in the years following 1985.

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(4) Department of Higher Education, New Jersey Licensed Professional Nurses, Health Manpower Information Series Report Number Three, Trenton, June 1975.

OPTOMETRISTS

A. Demand

The demand for optometrists is calculated using the following equation:

$$\dot{O}_t = \underset{(12.04)}{1.024}\,\dot{P}_t + \underset{(2.33)}{.591}\,\dot{V}_{ht} + \dot{I}_t \quad \text{where:}$$

$\dot{O}_t$ = the percentage change in optometrists due to changes in the independent variables below.

$\dot{P}_t$ = the percentage change in population to time period t.

$\dot{V}_{ht}$ = the percentage change in hospital services provided to time period t.

$\dot{I}_t$ = the projected impact of National Health Insurance on the demand for optometrists in time period t.

The r^2 for this equation is .958. The impact of National Health Insurance is estimated at 5.7% for the period from 1980 to 1985. It should be noted that age and income were not found to be statistically significant variables, due to the high correlation attributable to the population and visits variables.

B. Supply

The supply of optometrists was drawn from a comparison of licensure data and a 1973 DHEW survey of New Jersey optometrists. It is estimated that there were 690 full-time equivalent optometrists practicing in New Jersey in 1975. Future supply data were calculated using annual workforce attrition information and data provided by the Board of Optometrists on new licentiates through 1977.

PHARMACISTS

A. Demand

The demand for pharmacists is related to the supply of medical practitioners who are able to prescribe drugs. Accordingly, the model used relates the distribution of pharmacists to the distribution of physicians, as follows:

$$\dot{P}_t = .7632\ P\dot{H}Y_t + \dot{I}_t - \dot{Q}_{ts} \tag{5.9}$$

where:

$\dot{P}_t$ = the percentage change in pharmacists resulting from change in the physicians practicing in New Jersey.

$P\dot{H}Y_t$ = the percentage change in physicians practicing in New Jersey to time period t.

$\dot{I}_t$ = the projected impact of National Health Insurance on the demand for pharmacists in time period t (1980-1985).

$\dot{Q}_{ts}$ = An estimate of productivity changes in the time period to 1980 and 1985

The r^2 of this equation equals .805. The annual productivity gain is estimated at 2.5% and was calculated from prescription volume data from the Board of Pharmacists.

B. Supply

The 1975 supply of pharmacists was taken from data provided by the Board of Pharmacy. Information from the Department of Higher Education's 1974 survey of pharmacists was used to estimate the full-time and part-time mix of personnel. Data on new licentiates were also received from the Board of Pharmacists. Using these data and calculations on the attrition of pharmacists from the New Jersey workforce, future supply was determined.

VETERINARIANS

A. Demand

The demand for veterinarians is calculated using the following equation:

$$\dot{V}_t = \underset{(4.6)}{.5402}\,\dot{P}_t + \underset{(3.0)}{1.689}\,\dot{Y}_t$$ where:

$\dot{V}_t$ = the percentage change in the number of veterinarians resulting from changes in population and income.

$\dot{P}_t$ = the percentage change in population to time period t.

$\dot{Y}_t$ = the percentage change in permanent income to time period t.

The r^2 of this equation is .857.

B. Supply

The 1975 supply of veterinarians was developed using data from the Department of Health's Health Manpower Information System which are based on the results of a 1975 licensing survey. Additional data on non-licensed veterinarians working in research and industry were provided by the American Veterinary Medicine Association. These data indicate that there were 78 veterinarians working as non-licensed veterinarians in New Jersey in 1975. Future supply was determined using data on the attrition of veterinarians from the New Jersey workforce and data on newly licensed veterinarians provided by the Board of Veterinary Medical Examiners.

DIETARY PERSONNEL

A. Demand

As indicated in the narrative, staff was unable to develop a statistically sound equation to use to project the future demand for dietitians and nutritionists. Accordingly, the results of the equation used in the Health Professions Education Master Plan were used in this instance (see Appendix E of the Master Plan, page 221). Demand for these professions was based on the utilization of hospital services. This equates to a 28.1% increase from 1975 to 1985. These percentages were used to project future demand for both dietitians and nutritionists. In addition a 5.7% increase in demand caused by National Health Insurance is used for the project period ending in 1985.

B. Supply

Data on the 1975 supply of dietitians and nutritionists were taken from the Department of Higher Education's institutional survey.(5) The count of dietitians includes both ADA registered dietitians and baccalaureate level dietitians who are not ADA registered. Future supply of these professions was calculated using information on graduates of New Jersey programs and data on workforce attrition.

LABORATORY PERSONNEL

A. Demand

The equation for laboratory personnel is provided in the narrative of this report on page 26.

B. Supply

Data on the supply of laboratory personnel in New Jersey were taken from the DHE institutional survey.(6) To these baseline counts were added the results of the Department of Labor and Industry's OES survey of medical and dental laboratories. The base year supply for medical technologists, medical laboratory assistants, cytotechnologists and histologic technicians are assumed to include registered or certified personnel only. Those laboratory personnel who were identified as not certified in the DHE institutional survey are not included in these projections. In calculating future supply for these four occupations, data on the in-state retention of graduates of accredited educational programs were used to determine supply increases, in conjunction with decreases caused by attrition. In the case of medical laboratory technicians, 1975 supply and 1980 and 1985 projected supply include both certified and non-certified professionals. The inclusion of non-certified technicians was prompted by the recognition that approximately one half of the laboratory technicians working in New Jersey are not certified in their profession.

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(5) Department of Higher Education, Employment of Non-licensed Health Professionals in New Jersey , Health Manpower Information Series Report Number 5, Trenton, December 1975, pp. 15-18.

(6) Ibid., pp. 9-14.

MEDICAL RECORDS PERSONNEL

A. Demand

The equation used to project the demand for medical records personnel was developed from the Department of Health's SHARE system. This equation is as follows:

$$\dot{MR}_t = \underset{(13.4)}{.9454\ \dot{IPD}} - \underset{(-4.8)}{.217\ \dot{W}_t} - \underset{(-2.1)}{.105\ \dot{ALOS}_t} + \dot{I}_t \quad \text{where:}$$

$\dot{MR}_t$ = the change in medical records personnel resulting from changes in the variables below.

$\dot{IPD}_t$ = the percentage change in certified inpatient days to time t.

$\dot{W}_t$ = the percentage change in average medical records wages to time t.

$\dot{ALOS}_t$ = the percentage change in average length of stay to time t.

$\dot{I}_t$ = the projected impact of National Health Insurance on the demand for medical records personnel in the time period t (1980-1985).

The r^2 of this equation is .71. The expected impact of National Health Insurance equals 5.7% up to the period ending in 1985.

B. Supply

The 1975 supply of medical records personnel is taken from the DHE institutional survey results.(7) Only data on certified professionals are used. For administrators these data are based on the above noted survey. For accredited records technicians, survey data were compared to the 1975 AMRA Registry and its count of ART's was used in a full-time equivalent format. Future supply is calculated using the historical trends from the AMRA Registry for administrators and program graduates and attrition data for technicians.

RADIOLOGIC PERSONNEL

A. Demand

The equation used to calculate the future demand for radiologic technicians and nuclear medicine technologists was developed using distributional data provided by the Board of X-Ray Technicians Examiners. It is shown below:

$$\dot{XR}_t = \underset{(13.7)}{1.007}\ \dot{P}_t + \underset{(2.0)}{.751}\ \dot{A}_t + \underset{(1.7)}{.8426}\ \dot{Y}_t + \dot{I}_t - \dot{Q}_{ts} \quad \text{where:}$$

$\dot{XR}_t$ = the change in x-ray personnel resulting from changes in the variables below.

$\dot{P}_t$ = the percentage change in population to time period t.

$\dot{A}_t$ = the percentage change in age of the population to time period t.

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(7) Ibid., pp. 19-20

$\dot{Y}$ = the percentage change in permanent income to time period t

$\dot{I}_t$ = the projected impact of National Health Insurance on the demand for x-ray personnel in the time period t (1980-1985)

$\dot{Q}_{ts}$ = An estimate of productivity changes in the time period to 1980 and 1985.

The r^2 of the equation is .954. The impact of National Health Insurance is estimated at 5.7% over the projection period ending in 1985. Annual productivity increases are estimated at 1% per year.

B. Supply

The 1975 supply of x-ray technicians was estimated from data provided by the Board of X-Ray Technicians Examiners. Base year supply data on nuclear medicine technologists is taken from the DHE institutional survey. This count includes both ASCP registered technologists and x-ray technologists working in nuclear medicine.(8) Future supply for x-ray technicians is calculated using the historical growth trend in licensure provided by the Board of X-Ray Technicians Examiners. The supply projection for nuclear medicine technologists is based on the in-state retention of New Jersey program graduates and normal attrition from the workforce.

THERAPEUTIC PERSONNEL

A. Occupational and Physical Therapists

1. Demand

The demand for occupational and physical therapists is calculated using the following equation:

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(8) *Ibid.*, p. 13

$$\left(\frac{\dot{PT}}{Pop}\right)_t = \underset{(3.18)}{.826}\,\dot{V}_{ht} + \underset{(2.36)}{1.48}\,\dot{Y}_t + \underset{(2.30)}{.792}\,\dot{A}_t + \dot{I}_t - \dot{Q}_{ts} \quad \text{where:}$$

$\left(\frac{\dot{PT}}{Pop}\right)_t$ = The percentage change in the physical therapist to population ratio resulting from changes in the variables below.

$\dot{V}_{ht}$ = The percentage change in hospital services provided to time period t.

$\dot{Y}_t$ = The percentage change in permanent income to time period t.

$\dot{A}_t$ = The percentage change in the proportion of aged in the population to time period t.

$\dot{I}_t$ = The projected impact of National Health Insurance on the demand for therapists in time period t (1980-1985).

$\dot{Q}_{ts}$ = An estimate of productivity changes in the time period to 1980 and 1985.

The r^2 of this equation equals .70. The impact of NHI is estimated at 5.7% for the period from 1980 to 1985. Therapist productivity increases are estimated at 1.4% per year.

2. Supply

The base year count of physical therapists was taken from the Department of Higher Education's Health Manpower Information System. The 1975 supply of registered occupational therapists is based on data provided by the New Jersey Occupational Therapy Association. This information was transformed into full-time equivalents by using the full-time/part-time mix for occupational therapists found in the Department's institutional survey. The future supply of physical therapists is calculated by using data on new licentiates provided by the Board of Medical Examiners; the future effect of graduates of the Kean College program; and, a calculation of workforce attrition for physical therapists. The future supply of occupational therapists is calculated using historical information on the growth of registered therapists in New Jersey; new additions to the workforce from the Kean College program; and anticipated workforce attrition by these personnel. Calculation of 1980 and 1985 supply for certified occupational therapy assistants is based on graduate output of current programs; in-state migration of certified assistants; and, future attrition of assistants from the workforce.

B. Respiratory Therapists and Technicians

1. Demand

The demand for respiratory therapy personnel is calculated from an equation developed from the Department of Health's SHARE System, as follows:

$$\dot{RT}_t = \underset{(12.3)}{1.031}\ \dot{IPD}_t - \underset{(-2.54)}{.6413}\ \dot{W}_t + \underset{(2.95)}{.5012}\ \dot{CEX}_t + \dot{I}_t \quad \text{where:}$$

$\dot{RT}_t$ = the change in respiratory therapy personnel resulting from changes in the variables below.

$\dot{IPD}_t$ = the percentage change in certified inpatient days to time t.

$\dot{W}_t$ = the percentage change in average respiratory therapist wages to time t.

$\dot{CEX}_t$ = the percentage change in non-payroll expenditures per bed to time t.

$\dot{I}_t$ = the projected impact of National Health Insurance on the demand for respiratory therapy personnel in the time period t (1980-1985).

The r^2 of this equation is .68. The expected impact of NHI equals 5.7% for the period from 1980 to 1985.

2. Supply

The 1975 supply of respiratory therapists and technicians was developed from the Department's institutional survey and information provided by the New Jersey Chapter of the American Association for Respiratory Therapy. Future supply is calculated using data on program graduate levels, adjusted by in-state survival rates, examination pass rates, and full-time equivalent information. Separations from the workforce are also calculated for respiratory therapy personnel.

C. Speech Pathologists/Audiologists

1. Demand

The equation used for speech pathologists/audiologists is:

$$\dot{SP}/A_t = \underset{(6.25)}{.886}\ \dot{SE}_t + \underset{(2.16)}{1.32}\ \dot{Y}_t + \dot{TE}_t \quad \text{where:}$$

$\dot{SP}/A_t$ = the percentage change in speech pathologists/audiologists resulting from changes in the independent variables below.

$\dot{SE}_t$ = the percentage change in school enrollments to time period t.

$\dot{Y}_t$ = the percentage change in permanent income to time period t.

$\dot{TE}_t$ = the projected impact of increasing budgets in New Jersey for special education on the demand for speech pathologists/audiologists to time period t.

The r^2 of this equation equals .892. The projected impact of budget increase on speech pathologists/audiologists is 5% for the period to 1985.

2. Supply

The 1975 data on the supply of masters level speech pathologists and audiologists in New Jersey was provided by the Department of Education. Future supply of these professionals was estimated using educational output data on New Jersey's master's level programs adjusted for in-state retention and full-time equivalency. Workforce attrition is also used in the calculation of 1980 and 1985 supply.

REFERENCES

1. American Hospital Association. The 1976 Guide to Health Care Field. Chicago, IL., 1976

2. American Hospital Association. Hospital Statistics 1973. Chicago, IL., 1973, and subsequent annual reports to 1977.

3. American Medical Association. Socioeconomic Issues of Health. Chicago, IL., 1973

4. Beals, Ralph E. Statistics for Economics: An Introduction. Chicago: Rand McNally, 1972.

5. Dars, Lewis and Tomson, Jon. Development of a Uniform Data Base for State and Local Health Manpower Planning. Monograph I: Health Manpower Planning Series, Trenton, N.J., 1974.

6. Feldstein, Paul J. Financing Dental Care: An Economic Analysis. Lexington, MA: D.C. Heath Company, 1973.

7. Health Insurance Institute. Source Book on Health Insurance Data 1974-1975. New York, 1975.

8. Klarman, Herbert. "Economic Aspects of Projecting Health Manpower Requirements." Journal of Human Resources, Summer, 1969.

9. New Jersey Department of Education. Projected Enrollments in New Jersey Public School Districts. Trenton, N.J., 1977.

10. New Jersey Department of Health. Standard Hospital Accounting and Rate Evaluation. Trenton, N.J., 1975.

11. New Jersey Department of Health. 1976-1977 New Jersey State Medical Facilities Plan. Trenton, N.J., 1977.

12. New Jersey Department of Higher Education. "An Analysis of the Need for Nursing Personnel in New Jersey," Trenton, N.J., November, 1976.

13. New Jersey Department of Higher Education. An Analysis of the Need for Physicians in New Jersey 1975-1985. Health Manpower Planning Series Report Number One. Trenton, N.J., December, 1977.

14. New Jersey Department of Higher Education. An Inventory of Health Professions Education Programs in New Jersey. Health Manpower Planning Series Report Number Two. Trenton, N.J., January, 1978.

15. New Jersey Department of Higher Education. "A Study of the Potential Need for Nurse Practitioners and Physician's Assistants in New Jersey." Trenton, N.J., January, 1977.

16. New Jersey Department of Higher Education. "An Update of the Analysis of the Need for Dentists." Trenton, N.J., October, 1975.

17. New Jersey Department of Higher Education. Employment of Non-licensed Health Professionals in New Jersey. Health Manpower Information Series Volume One Number Five. Trenton, N.J., December, 1975.

18. New Jersey Department of Higher Education. Health Professions Education Master Plan. Trenton, N.J., May, 1973.

19. New Jersey Department of Higher Education. New Jersey Licensed Professional Nurses. Health Manpower Information Series Volume One Number Three. Trenton, N.J., June, 1975.

20. New Jersey Department of Labor and Industry. Population Estimates for New Jersey, 1975. Trenton, N.J., 1976.

21. New Jersey Department of Labor and Industry. New Jersey Population Projections: 1980-2020. Trenton, N.J., July, 1975.

22. New Jersey Department of Labor and Industry. "Provisional County Projections in New Jersey by Age, Sex and Race, 1985." Working Paper Number One. Trenton, N.J., November, 1975.

23. New Jersey Department of Law and Public Safety, Board of Pharmacy. Annual Reports 1972-1976. Newark, N.J., 1972-1976.

24. Robert Nathan Associates. Assessment and Evaluation of the Impact of Archetypal National Health Insurance Plans on United States Health Manpower Requirements. Published by National Institutes of Health. Washington, D.C., 1973.

25. Sales Management Inc. Sales Management's Sales Marketing Management, New York, Various issues.

26. U.S. Department of Commerce. Area Projections, 1990. Washington, D.C.: Government Printing Office, 1974.

27. U.S. Department of Health, Education and Welfare. Health Resources Statistics, 1975. Rockville, MD., 1975.

28. U.S. Department of Health, Education and Welfare. Health Manpower in Hospitals. Rockville, MD., 1970.

29. U.S. Department of Labor. Tomorrow's Manpower Needs. Supplement 4: Estimating Occupational Separations from the Labor Force for States. Washington, D.C., 1974.

Appendix V

Summary of Major Findings and Recommendations of Scope and Cost Study for Health Professions Education Programs in New Jersey (DRAFT)

The major finds and recommendations of this study are briefly summarized in the following narrative. These conclusions are based upon extensive and thorough analyses and discussion of the costs and benefits of the policy alternatives which appear in the actual study. Therefore, they are not repeated within this summary. It should be noted that these findings and recommendations reflect the current status of the scope and cost study which is still in draft form so they may not be final. All fiscal projections are given in terms of current dollars.

A. Medical Education

The Department's most recent projections of the State's need for physicians indicate that presently the supply of physicians is rapidly approaching demand for these practitioners. However, recently enacted federal health manpower legislation, which provides new limitations on the immigration of foreign medical graduates (FMG's) into the country will, by 1982, have a substantial impact on the projected growth in the State's physician supply. Since New Jersey currently depends upon an unrestricted flow of FMG's for a majority of its new licentiates, it is projected that the new federal immigration restrictions will create a shortage of 1900 physicians by 1985. This shortage represents 13% of the projected physician supply for that year. However, while this State is facing an acute shortage of physicians, nationally there is strong evidence that the historical shortage of physicians is coming to an end, chiefly because of the rapid growth of medical education over the past ten years. It should be expected, therefore, that if the State continues to attract out-of-state U.S. medical school graduates at its present rate, the State should reap some benefits from the increase of graduates from out-of-state domestic medical schools. Staff estimates that the State could gain an additional 350 physicians by 1985, which could reduce the projected 1985 shortage from 1900 to 1550 physicians. This shortage represents 10.5% of the projected 1985 supply. In addition to the projected physician shortage, there is growing evidence that many urban and rural areas within the State and public correctional and health care facilities suffer from serious primary care physician shortages (i.e., a maldistribution problem).

Given these projections of future manpower needs, staff explored a number of strategies aimed at meeting the State's projected medical services needs in the most economical, efficient and qualitative manner. As a result of this analysis the following recommendations are made:

1. The State's first priority should be to develop programs aimed at: (a) retaining a larger percentage of the physicians currently educated by the State; (b) attracting more American medical graduates from other States, and; (c) correcting the State's present geographic and specialty maldistribution of physicians. The Department has developed two such programs which have been endorsed by the Board and should be implemented.

    a. The newly enacted Graduate Medical Education program will establish a statewide mechanism to improve the quality of primary care graduate medical education in the State through short-term grants-in-aid to support the educational costs of selected programs. This will improve physician supply by attracting a larger number of CMDNJ and other American medical graduates to the State to practice. Further, since the funds provided by this program will be utilized to encourage the development of primary care residency programs, it will enhance the quality of medical care available to our population by making a significant contribution toward relieving the present specialty maldistribution problem.

b. The Physician-Dentist Loan Redemption Program currently pending in the State legislature has been designed to specifically address the acute shortages of primary care physicians and dentists in many areas of the State. The program can address these needs by providing an attractive financial incentive for a selected number of graduates of the CMDNJ and FDU School of Dentistry to practice primary care medicine and dentistry in those areas and facilities designated as underserved.

2. A high priority should also be given to the education of appropriate numbers of physician support personnel, specifically nurse practitiioners and physician assistants, who can be employed to increase the productivity of the present supply of physicians. If physician assistant enabling legislation is passed in New Jersey, the State can, through continuation and possible addition to its physician assistant and nurse practitioner programs, made a significant supply of these practitioners available to the State's primary care physicians. The analysis set forth in the staff study concludes that if these professionals are efficiently utilized within physician practice settings the resulting productivity improvements could substantially reduce the State need for additional physicians.

3. The staff study presents projections of gross expenditures and State appropriations required for a variety of medical student enrollment options for New Jersey Medical School (NJMS), Rutgers Medical School (RMS) and the New Jersey School of Osteopathic Medicine (NJSOM). These projections are presented in Table A. For NJMS these enrollment options represent logical alternatives given the capacity of the physical plant in Newark. For RMS and NJSOM the eight options chosen for the staff analysis include both currently approved plans for the South Jersey Medical Education Program, and the CMDNJ's proposal for expansion of the New Jersey School of Osteopathic Medicine.

TABLE A

CMDNJ-NJMS, RMS-PISCATAWAY & SOUTH JERSEY, NJSOM
Projections of Undergraduate Medical Enrollment, Constant Dollar Appropriations and Capital Requirements for Selected Enrollment & Organizational Options: FY 1988

	Present Enrollments; Joint Basic Sciences for RMS & NJSOM; Present RMS-SJ Program #1A	Present Enrollments; Joint Basic Sciences for RMS & NJSOM No RMS-SJ Program #1B	CMDNJ Proposal for Independent NJSOM: Larger RMS-SJ Program #2A	CMDNJ Proposal for Independent NJSOM: No RMS-SJ Program #2B	Joint Basic Sciences for RMS & NJSOM; Maximum NJSOM Enrollment: No RMS-SJ Program #3A	Joint Basic Sciences for RMS & NJSOM; Maximum NJSOM Enrollments w/RMS-SJ Program #3B	Joint Basic Sciences for RMS & NJSOM; RMS-SJ & NJSOM at 32 per class #3C	Joint Basic Sciences for RMS & NJSOM; Use for COTRANS; RMS-SJ & NJSOM at 48 per class #4
Class Size								
NJMS(1)	140	140	*	*	*	*	*	*
RMS-P	96	108	108	140	108	108	108	108(3)
RMS-SJ	12	0	32	0	0	32	32	48(4)
NJSOM	24	24	100	100	100	100	32	48(5)
TOTAL	272	272	*	*	*	*	*	*
NJMS at 170(1)	*	*	410	410	378	410	342	374(6)
NJMS at 200(1)	*	*	440	440	408	440	372	404(6)
Appropriations(2) (000's)	41,034	39,074						
NJMS at 170(1)	*	*	52,970	51,736	47,655	52,016	47,093	44,249
NJMS at 200(1)	*	*	53,888	52,653	48,572	52,934	48,010	45,166
Capital Budget($000's)	12,000	12,000	42,900	42,900	24,503	27,628	18,251	12,000

NJMS: New Jersey Medical School
RMS-P: Rutgers Medical School Piscataway
RMS-SJ: Rutgers Medical School South Jersey clinical campus
NJSOM: New Jersey School of Osteopathic Medicine

(1) Option 1 assumes a class size of 140 for NJMS which represents present FY 1979 enrollment levels. However, for the remaining options, total class size and appropriations are exhibited for two additional NJMS enrollment options: 170 students per class which represents planned enrollment increases and 200 per class which represents maximum physical plant capacity.

(2) The projection parameters used to develop the educational unit budgets are based on the College's perception of an ideal, fully funded budget. However, projections for FY 1988 total DHE appropriations, to which the CMDNJ projections will be compared, are based on past trends. Therefore, CMDNJ educational unit projections were scaled down by a 15% deflation factor to make the College's appropriations forecast more comparable to projections of the overall DHE budget. This deflation factor is based on past trends in the difference between the College's working budget minus the current year's salary program and the DHE recommendation for that year.

(3) Includes 24 COTRANS students in 3rd and 4th years.

(4) Includes 24 COTRANS students in 3rd and 4th years.

(5) Includes 16 COTRANS students in 3rd and 4th years.

(6) Includes 56 COTRANS students in 3rd and 4th years.

One alternative examined was to hold enrollments to present FY 1979 levels and accept the consequences of a major shortfall in physician supply and the utilization of present physical plant below its maximum capacity. This would mean holding entering class size to 272 students. Even so the costs of fully phasing in and maintaining this position would be $41 million, an increase of $14 million over the FY 1979 budgets for those educational units.

At the other extreme, if we were to accept the CMDNJ proposal for the development of a free-standing school of osteopathic medicine in the Camden area, while also increasing enrollments at NJMS to its full capacity, total enrollments could be increased 62% to 440 students per class. However, this alternative could require a State appropriation of $54 million, $27 million over the FY 1979 budget.

We propose a middle position that fully utilizes our facilities and faculty resources and provides a class size that is responsive to projected manpower needs and can be achieved in an efficient and economical manner. By proposing the following array of programs, enrollments can be increased to 400 students per class, at a cost of approximately $45 million in appropriations. Although this class size is 40 students below the level that could be achieved through the above proposal, it could be implemented by a state appropriation of $9 million less per year, and without any addition to the College's physical plant. This can be accomplished in the following manner:

a. Enrollments at NJMS should be permitted to grow to 200 students per class which represents the College's estimate of the maximum capacity of the existing physical plant in Newark.

b. Enrollments at RMS-Piscataway should be permitted to reach the currently planned enrollment level of 108 students per class.

c. Osteopathic students should continue to receive basic science instruction jointly with RMS students in order to fully utilize that campus's physical plant and basic science faculty. Since the College estimates that the Piscataway basic science facility can accomodate up to 140 students per class, NJSOM enrollments could grow at least to 32 students per class.

d. In addition, the COTRANS program should be utilized to increase third and fourth year enrollments at both RMS and NJSOM. COTRANS students are third-year American transfer students from foreign medical schools. The staff recommendations is that 16 of these third year transfer students could be added to the above noted class size of 32 students at NJSOM for a new total of 48 students per class. The addition of 48 COTRANS students would permit the RMS-Piscataway chlinical program to maintain a class size of 108 students, some of whom are COTRANS students, and a clinical class size of 48 students at Cooper Hospital, some of whom would also be COTRANS students. Since COTRANS students have already completed their basic science education, there is no need to expand physical plant or basic science faculty to accomodate these additional students.

4. Although it is recommended that joint basic science instruction of RMS and NJSOM students be continued, staff recognizes the problems of academic control and logistics perceived by the NJSOM faculty as stemming from the utilization of Rutgers Medical School basic sciences faculty and facilities in Piscataway for the instruction of NJSOM students. Therefore, it is recommended that outside consultants, possibly from Michigan State's innovative allopathic and osteopathic programs, be engaged to aid the Department and the College in exploring the feasibility of the following alternatives:

    a. The organization of basic sciences at RMS into a separate school with an independent dean (i.e., neither RMS nor NJSOM). Under this concept both allopathic and osteopathic faculty would have formal on-going means for input into curriculum and quality control matters to assure that the distinctive needs of each school are satisfied where reasonable, necessary and efficient.

    b. Alternatives to alleviate the logistical problems posed by the clinical instruction of first and second-year NJSOM students based in Piscataway while osteopathic clinical faculty and facilities are located in the Camden area. These should include the use of allopathic Central Jersey hospitals for the clinical instruction of osteopathic facilities in the area, and, possible jointure, to some degree, of the clinical instruction of RMS and NJSOM first and second-year students.

Staff estimates that by the end of the physician manpower projection period these increases in CMDNJ enrollments along with the other alternatives recommended above would decrease the projected Statewide physician shortage to 484 physicians, 3% of the estimated supply in that year. It should be noted, however, that the recommended enrollment increases will only be phased in by the end of the projection period. Therefore the full cumulative impact on future physician supply of these enrollment increases will not be felt until after the projection period, so that the benefits of these increased enrollments are not fully reflected in these data.

5. Expenditure projections provided by the College for NJMS, RMS and NJSOM assume combined enrollments of 220-315 in Ph.D. and post-doctoral biomedical sciences programs. These enrollments are 40-100% above FY 1979 enrollment of 156. They represent maximum efficient enrollments given the projected sizes of basic science faculties under each option. The Department recognizes that the presence of biomedical sciences graduate program has a positive effect on undergraduate medical education because it enhances the quality of research conducted at each school, and it increases the College's ability to recruit first-rate basic science faculty. On the other hand, although there is no New Jersey-specific data available, recent national studies indicate an impending surplus of biomedical scientists. In this regard, further increases at the GSBS and in the RMS graduate program cannot be justified especially since these programs are very costly. Therefore, the Department should not finance significant increases in Ph.D. and post-doctoral enrollments beyond budgeted levels unless a specific need for these professionals can be demonstrated.

B. Dental Education

According to the Department's most recent projections, the State is nearly at an equilibrium situation with regard to dental manpower, that is, by 1985, the State's projected supply of dentists will be almost sufficient to meet its demand for these personnel, and only a small state-wide shortage is projected. However, although the State's need for dentists is diminishing, the current level of educational effort is needed to maintain these favorable projections. In light of these projections therefore staff makes the following recommendations:

1. The State should, at least in the short-term, continue to subsidize the Fairleigh Dickinson University School of Dentistry, following the present contract approach, in order to maintain the current level of dental education in the most efficient and economical manner. This recommendation was drawn from an analysis which concluded that the future cost to the State of subsidizing FDU would be significantly less than the alternative of significantly increasing dental student enrollments at the New Jersey Dental School. However, it is recognized

that a number of the variables which govern forecasts of the State's dental manpower needs may change. In light of this caveat, therefore, the question of long-term support of FDU should be left open. The Department should periodically evaluate the contract program in the light of any foreseen and significant decreases in the State's need for dentists.

2. With regard to future levels of support for FDU, staff recommends that increases over the present proportion of the deficit assumed by the State should be linked to increases in the number of FDU gradutes remaining in the State to practice.

3. Staff analyzed the implications, in terms of appropriations requirements and manpower needs, of a number of dental student enrollment options for the CMDNJ-New Jersey Dental School. The analysis indicated that significant economies of scale in terms of decreasing cost per dental student could be achieved by increases in enrollment at NJDS. However, enrollment growth beyond present plans to increase entering class size from 80 to 88 students, results in only small additional decreases in cost per student and is not warranted given the favorable manpower situation. Therefore the CMDNJ-NJDS should be permitted to continue its plans to increase dental student enrollment to 88 students per year. Unless new developments arise which unfavorably alter the projected need for dentists, enrollment should not be increased beyond that point.

4. The expenditure and appropriation projections for NJDS assume a combined enrollment of 59 students in the School's post-doctoral dental specialty and residency programs, a doubling of the present enrollment of 29 students. This enrollment was chosen as a maximum, cost effective enrollment given the projected size of the NJDS faculty. It is estimated that $1,270,000 or 15% of the Dental School's total projected expenditure budget, would be devoted to the instruction of these students. Department staff recognized that the presence of a graduate program has a positive effect on DMD-level dental education because it enhances the quality of research conducted at NJDS and it increases the College's ability to recruit first-rate dental faculty. On the other hand, There is no data available which documents the need, if any, within the State, for additional dental specialists. Therefore, given the cost of these programs and the lack of information on the need for dental specialists, the Department should not approve any increases in post-doctoral enrollments above currently budgeted levels unless a specific manpower need can be demonstrated.

C. Other Issues in Financing Medical and Dental Education

1. CMDNJ Teaching Hospitals

The CMDNJ staff developed ten-year projections of expenditures and state appropriations required to operate the new College Hospital, Raritan Valley Hospital and other, affiliated hospitals. Presently, the State's appropriation to Raritan Valley and the College Hospital and the CMDNJ's subsidy of affiliated hospitals are made to cover the cost of caring for the medically indigent and additional costs of hospital operation which can be attributed to medical education and are not covered by third party payors.

The projections indicate that Departmental support for the CMDNJ's core teaching and affiliated hospitals could rise 38% from $15.9 million to $22 million by FY 1988. However, staff projects that over the next few years, one or more new pieces of legislation (i.e., the recently enacted State hospital rate setting law, the pending State medical indigency bill, national health insurance) will provide funding for indigent care through hospital rates covered by third party payors or through general revenues. Staff estimates that the removal of a large portion of indigent care support from the DHE budget would reduce future appropriations by at least $10 million annually. This would drop FY 1988 appropriations 24% below the FY 1979 level, from $15.9 million to $12 million: $9.5 million to support the College Hospital and Raritan Valley Hospital and $2.5 million to subsidize the additional operating costs of affiliated hospitals engaged in significant medical education activity. It is recommended that Department staff monitor the progress of this legislation and work towards the proper removal of the cost of caring for the medically indigent from the higher education budget.

2. Tuition at the CMDNJ

Since 1975 medical and dental school tuition for in-state residents has risen from $1,050 to $4,000. These tuition increases were due to both budgetary pressures and the belief that medical and dental students should pay for a more equitable portion of the net educational costs of their professional training. However, a general policy to determine equitable future increases in tuition at the CMDNJ has never been set by the Board of Higher Education.

Staff examined two policy options for the determination of future tuition levels. The first option was the CMDNJ's recommendation that changes in tuition be annually indexed to the percent of increase or decrease in the educational cost per student, using the tuition base of $4,000. The alternative policy would be to charge medical and dental students a high rate of tuition, perhaps $8,000 to $12,000 per year, while supplying students with sufficient loan monies to finance their education and offering them an opportunity to have up to 85% of these tuition costs remitted back to them by the State through practices in an underserved area in New Jersey.

D. Nursing Education

Assuming present nursing program enrollment caps remain in place, the State can anticipate a near balance between nursing supply and demand. A relatively small surplus of nurses is projected by 1985. However, in order to maintain this equilibrium situation, the magnitude of current educational efforts should be maintained. The question reviewed by this study is whether the State should continue to support private college and diploma nursing programs through the Aid to Schools of Professional Nursing Act. Staff recommends the following:

1. Given the contribution of these programs to the State's supply of nurses, it appears desirable both from a fiscal and eduational point of view to continue financial support of private college and hospital nursing programs. However, given that it is only necessary to maintain present educational efforts in this area, total support should remain at its current level.

2. Future support of diploma schools of nursing should be contingent upon their meeting program accountability measures instituted by the Department in cooperation with these programs and the State Association for Diploma Schools of Nursing. These will include requests for data on educational and employment outcomes of these programs and establishment of yearly reports on the educational costs of these programs.

3. Steps should be taken by the Department and nursing programs to expand opportunities for educational mobility from diploma and associate degree programs to upper division baccalaureate nursing programs. Currrently practicing RN's expecially have difficulty in upgrading their education because very few of our baccalaureate institutions make provision for their special needs. Department staff and HPEAC are now developing a number of policy recommendations aimed at expanding opportunities for educational mobility. However at this time it is recommended that collegiate institutions which currently have generic BSN programs be encouraged to develop plans for special education programs for practicing RNs through the provision of modest start-up grants.

E. Veterinary Medical Education

The Department's updated projections indicate that the State's current shortage of veterinarians will grow to approximately 100 full time equivalents by 1985 or approximately 10% of the projected supply of veterinarians in that year. Therefore, staff recommends the following with regard to future veterinary medical education efforts:

1. The Department should continue support of the existing veterinary medical education contract program as a means of both meeting the State's shortage of veterinarians and securing access to veterinary medical education for New Jersey residents, without constructing and maintaining a school in this field.
2. The Department should continue to take steps to maximize minority participation in this program. These steps include: (a) maintaining a contract with Tuskegee Institute; (b) including veterinary medicine as a career area in the new Baccalaureate Pre-Medical/Dental School Programs for Educationally Disadvantaged Students; (c) working with the New Jersey Veterinary Medical Association to form a recruitment team composed of minority members of that organization.
3. The Department should work with contracting schools and the New Jersey Veterinary Medical Association to implement a mechanism for tracking New Jersey veterinary graduates. In this way substantial data on the rates of return to New Jersey of contract program graduates can be collected to determine whether it is necessary to establish the administrative mechanism needed to enforce compliance with a requirement that program participants establish practice in New Jersey.

F. Optometric Education

The Department's manpower projections indicate that the State's current minimal shortage of optometrists will increase significantly by 1985. Further, if no provision is made to obtain access to optometric colleges for State residents the projected 1985 shortage will worsen. Therefore, staff recommends the following:

1. The Department of Higher Education was recently authorized to initiate a contract program with out-of-state colleges of optometry to secure places for qualified New Jersey residents. This contract program should be implemented in order to meet projected optometric manpower needs without the necessity of constructing and maintaining a school of optometry.

2. In implementing this program, the Department should work with contacting Schools of Optometry and the New Jersey Optometric Association to track program graduates in order to determine the necessity of requiring graduates to practice in New Jersey.

3. As in the Veterinary Medical Education Program, measures should also be taken to maximize minority participation.

G. Allied Health Professions Eduation

The Department's most recent projections indicate the following with respect to the State's needs for allied health professionals:

1. The State can anticipate significant surpluses in a certain number of allied health professions.

2. At the same time, shortages are still projected for other selected types of personnel.

3. Given recent trends in health care delievery and the population's changing health services requirements, the State can anticipate the need for a number of "new" health professions.

The staff study projected future enrollments and State support levels for allied health professions education programs at the CMDNJ-School of Allied Health and at the formula-funded public colleges and universities. It was found that total State support for allied health professions will grow from $7,675,000 in FY 1979 to $13,200,000 by FY 1988, if: (1) enrollments for existing programs continue to grow as a function of past trends; (2) all present allied health program development plans proposed by non-CMDNJ units were approved by the Board and implemented, and; (3) the Board approves all the programmatic changes and additions which the CMDNJ-School of Allied Health Professions would like to implement over the next ten years. This represents a 72% growth over the next ten years. This projected increase in State support does not necessarily represent net increases in funding. For the most part, at least in the formula-funded institutions, these allied health program increases could be funded by a reallocation of present levels of support. Nonetheless, these cost implications underline the need to take steps to insure the efficient allocation of educational effort and support dollars to allied health programs in view of both manpower need and program costs. The staff makes two recommendations regarding future allied health professions program approval. These are:

1. Regionalization of health professions programs should be strongly considered with regard to the initiation of new programs and the consolidation or termination of existing programs. As part of the 1980 Higher Education Statewide Planning effort, the Department has established a task force on Regionalization in Health Professions Education. That task force is charged with making a review of the number and variety of health professions education programs in the State offered at three levels - associate, baccalaureate and graduate degrees - for the purposes of identifying met and unmet programmatic needs on a regional basis and recommending priorities regarding the initiation consolidation or termination of programs. Recommendations are to be based not only on manpower needs but also on such considerations as: character and mission of individual institutions within a region (i.e., "experience, resources and/or potential" in the health field); quality of individual programs as measured by such indices as rate of student passage of certification exams, and professional program accreditation; viability as measured by student demand, enrollment, number of degrees awarded and employment of graduates.

2. The feasibility of instituting program cost analysis should be studied, and the results considered for use in the approval of new health professions education programs. In order to better inform decision-making concerning the allocation of scare financial resources to allied health professions education, the Department should explore the feasibility of instituting a cost methodology which is able to analyze the total costs of health professions programs within one consistant framework. This cost methodology should be designed as both a cost allocation and a program planning tool. It should be based on program structure and content and possess the capacity to estimate the costs of new curricula.

H. Implications of These Recommendations on Future Health Professions Appropriations

The Table on the following page summarized the fiscal implications of the study's recommendations concerning health professions education programs. In brief, the study concludes that if the above program recommendations were implemented, health professions educations's share of DHE resources could grow 14% to 19%. This represents a constant dollar appropriation increase of $21.6 million for the health professions.

TABLE 8

COMPARISON OF FY 1979 APPROPRIATIONS AND FY 1988 CONSTANT DOLLAR PROJECTIONS OF NET STATE APPROPRIATIONS FOR DISCRETELY FUNDED(1) HEALTH PROFESSIONS EDUCATION PROGRAMS AND TOTAL DHE APPROPRIATIONS

	FY 1979		FY 1988	
	$000's	% of Total DHE Budget(2)	$000's	% of Total DHE Budget
Extraordinary Programs:				
Schools of Prof. Nursing	1,500	0.3%	1,500	.3%
FDU Dental School	2,305	0.6%	2,433	.6%
Vet. Med. Educ. Prog.	861	0.2%	1,152	.3%
Optometric Educ. Prog.	-	-	400	.1%
Grad. Med. Prog.	-	-	1,425	.3%
Loan Redemption Prog.	-	-	1,404	.3%
SUBTOTAL EXTRAORDINARY	4,666	1.1%	8,320	1.9%
CMDNJ				
Educational Units(3)	38,608	9.2%	60,105	14.2%
Hospital Units(4)	15,650	3.7%	12,084	2.8%
SUBTOTAL CMDNJ	54,258	13.0%	72,189	17.0%
TOTAL HEALTH PROFESSIONS	58,925	14.1%	80,509	18.9%
TOTAL DHE APPROPRIATIONS(5)	418,600	100.0%	424,642	100.0%
STATE SUPPORT(6)	-	-	396,339	-
FUNDING GAP	-	-	28,303	-

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(1) Does not include estimated support for allied health professions subsumed in formula budgets of non-CMDNJ units since this is not a net increase in support.

(2) Percentages may not add up due to rounding.

(3) The projection parameters used to develop the educational unit budgets are based on the College's perception of an ideal, fully funded budget. However, projections of FY 1988 total DHE appropriations are based on past trends. Therefore, CMDNJ educational unit projections were scaled down by a 15% deflation factor to make the College's appropriations forecast more comparable to projections of the overall DHE budget. This deflation factor is based on past trends in the difference between the College's working budget minus the current year's salary program and the BHE recommendation for that year.

(4) The FY 1988 hospital unit appropriations projection assumes that $10 million in indigent care costs will be removed from the College's hospital budget.

(5) Projections provided by DHE Office of Budget and Fiscal Planning. Based on simple regression analysis utilizing higher education net State unadjusted appropriation from 1967-1978. The standard error of this estimate, excluding CMDNJ units, is ± $12,061.

(6) This is a projection of future State support for higher education provided by the DHE Office of Budget and Fiscal Planning. It is based on a simple regression analysis utilizing total state revenues from 1967-1978. The projection assumes that higher education will continue to receive its current share of total state revenues. The standard error of this estimate is ± $10,674.

Extraordinary program appropriations are projected to increase from $4.7 million in FY 1979 to $8.3 million in FY 1988 and their share of the total DHE budget will grow from 1% to 2% of total DHE appropriations.

The primary source of growth in health professions education appropriations is a large increase for the CMDNJ. State appropriations for the College are projected to grow fro $54.3 million in FY 1979 to $72.2 million in FY 1988, and its share of DHE resources could grow from 13% to approximately 17% by FY 1988. As the Table demonstrates this increase is entirely due to the growth of CMDNJ educational units. Their appropriations requirements are projected to rise from $38.6 million in FY 1979 to $60.1 million, a 56% increase in appropriations. It should be noted, however, that these projections of CMDNJ educational unit appropriations needs do not include the possibility that a part of the cost of clinical faculty at Rutgers Medical School and the New Jersey School of Osteopathic Medicine will be covered by third party payors due to the fact that these faculty will provide patient care services as part of their activities at the College's core teaching and affiliated hospitals. If in fact a portion of clinical faculty salaries are covered by third party payors, staff estimates that CMDNJ educational appropriations would be reduced by approximately $6 million to $53.1 million by FY 1988, reducing the College's share of the total DHE budget by approximately 1%, to 16% of the total.

The health professions education appropriations forecast is compared to a projections of total DHE appropriations based on past trends in higher education support. As you will note, however, the Table also presents another, reduced forecast of State support which points to the possibility of a future funding gap for higher education as a whole. This reduction is caused by a decrease in total State revenues as projected by DHE staff. It is meant to illustrate the possible fiscal constraints under which the entire higher education system may be functioning over the next ten years.

These fiscal projections and the fact that the primary source of growth in health professions education will be for appropriations to support undergraduate medical education, underline the need to insure that the State's medical education programs are conducted in a qualitative but still efficient manner. In 1977, at Department request, the New Jersey Dental School conducted an excellent self-study which outlined a number of cost containment strategies for its undergraduate and graduate dental education programs. A number of these recommendations have been implemented by

NJDS and the Department has requested that the dental school's faculty and administration review the remaining recommendations and establish a time table for their implementation. It is recommended, therefore, that a similar study be conducted of the current operational modes at New Jersey Medical School, Rutgers Medical School and the New Jersey School of Osteopathic Medicine in order to determine if steps can be taken to reduce program costs at these institutions while maintaining a high level of academic excellence and integrity.

Appendix VI

Staff Paper on the Coordination of the Department of Higher Education with New Jersey's Health Systems Agencies

Coordination of Health Professions Education Planning Initiatives at State and Local Levels

New Jersey Department of Higher Education

Edward Cohen, Assistant Chancellor
Health Professions Education

Offices for Health Professions Education
and Health Manpower

Prepared by Jon Tomson

April 4, 1977

Index of Attachments (not included with this version)

Appendix I

Health Professions Education Advisory Council 2/72-7/74)
HPEAC Summary 7/74 to 7/75
HPEAC Summary 7/75 to 7/76

Appendix II

"Health Manpower Information System Users Manual"

Appendix III

"An Inventory of Health Professions Education Programs in New Jersey"

"An Inventory of Clinical Used by Health Professions Education Programs in New Jersey"

Appendix IV

"Health Professions Education Master Plan"

Introduction

This paper has been developed to facilitate the coordination of health manpower planning activities at the health service agency level with the ongoing system functioning within the New Jersey Department of Higher Education. The Department has been actively involved in health manpower planning since 1972 when the development of the Health Professions Education Master Plan began. In 1973, the Master Plan was completed and approved by the Board of Higher Education. Since its approval the Health Professions Education Master Plan has provided policy guidelines for educational program development in the health professions throughout New Jersey's higher education network.

An integral element of the Master Plan was the specification of peer advisory mechanisms in the areas of program development and planning. The central mechanism used to ensure advisory input from all relevant sectors is the Health Professions Education Advisory Council and its substructure. The Department provides staff to this advisory network from the Office of Health Professions and the Office for Health Manpower. The Office of Health Professions Education is involved with health professions education policy and program development activities, as well as coordination of activities and programs of the College of Medicine and Dentistry of New Jersey. The Office for Health Manpower, on the other hand, concerns itself primarily with the technical and quantitative aspects of health manpower planning, including projections of future supply and demand for certain health professions in New Jersey.

We have developed this information paper for use in each of the health systems agencies in the state. We expect that this narrative will enable you to understand what the history and current status of health professions education planning in New Jersey are; what the functions and responsibilities of the Department of Higher Education are in this area; who are the people at the state level involved in health professions planning; what services and information we might provide your agency as you develop a local health manpower planning capacity; and, how your agency can be linked to this planning process to ensure that you are afforded effective input into it. In this manner, we hope to develop good coordination between state and local health manpower planning activities, while perhaps enhancing the same among the five HSAs.

It should be recognized that this paper concerns itself solely with health manpower planning as it relates to the development of post-secondary educational programs. As such, other important areas will not be addressed herein, namely CETA and secondary level vocational-technical educational planning activities, and hospital-based educational programs. Also, health manpower data collection and analysis responsibilities are no longer centralized within the Department of Higher Education. These activities are now coordinated through the Department of Health's Health Data Research and Analysis Services Unit which is under the direction of Mr. Henry Watson. Requests for current health manpower and other health related data should be directed to that unit.

The remainder of this report is organized as follows: description and current status of the Health Professions Education Master Plan; organization of the Health Professions Education Advisory Council; description of the program review process; organization of the Offices of Health Professions Education and Health Manpower and their current activities; local agency functions in the health professions education planning process; mechanisms for local coordination with state manpower planning initiatives; and, an appendix with supporting documentation.

The Health Professions Education Master Plan

Over a period of two years, the New Jersey Department of Higher Education developed the first Health Professions Education Master Plan (HPEMP), to address the need for a coordinated network of educational programs to meet the State's future needs for health manpower. The development of the Master Plan involved the three main groups which would ultimately be affected by its implementation: post-secondary institutions preparing health professionals; professional and licensing organizations in the health professions and employers of health personnel; and the general public receiving health services from graduates of the programs involved. In recognizing these publics and their needs, and in order to facilitate concrete and reasonable educational planning, it was necessary to focus on only a portion of the more than 125 separate occupations which make up the health professions field. Twenty-five occupations were chosen as a starting point, representing the highest priority fields necessary to a sound contemporary health care system, and each of these was studied in some depth in terms of current supply, projected needs utilization, existing training programs, and emerging trends in patterns of education and career mobility. A copy of HPEMP is included with this report under separate cover.

In attempting to take an overall look at the relationship between the current and projected delivery of health care and its relationship to the education of health professionals, the Master Plan set six major objectives for the development of health professions education in New Jersey:

1. The planning of an educational system which will promote the concept of the team approach in the delivery of health services.
2. The recognition of the higher education community as a full, active and responsible partner in the making of decisions which will affect the future shape of health care systems.
3. The identification of pedagogic approaches which can contribute to the development of successful programs.
4. The establishment of standards and mechanisms to assure quality in clinical training, recognized as a prime component of all programs.
5. The development of a matrix to guide statewide and institutional decisions regarding the numbers and types of health personnel needed.
6. The creation of an advisory mechanism for planning, program review, evaluation and maintenance of standards.

The Master Plan was developed to reflect the continuing search for balance between the levels of preparation and retraining of health personnel and their performance of duties, by calling for modifications in existing curricula, additional areas of study, and specialized training. In addition, a fundamental assumption has been that the shortage of such prime professionals as physicians, dentists and pharmacists cannot be met merely through increasing their numbers; auxiliary personnel must be properly trained and then permitted to take over aspects of the traditional duties of these top professionals. The team approach to health is therefore foreseen as a major (although not all-pervasive) characteristic of future health delivery systems. Finally, three collateral goals are basic to the recommendations made in the Master Plan: the recruitment of personnel, particularly from the educationally disadvantaged and minority population groups; the retention of these personnel through opportunities for skills upgrading and continuing education; and the development of career mobility through the articulation of proficiency and equivalency examinations.

These considerations, and the proposed implementation of the Master Plan's goals, are elaborated within the twelve chapters of its text. One chapter provides specific manpower data and projections on the 25 occupations selected. The Plan makes 116 specific recommendations, 43 of which relate to general objectives, and 73 to particular needs of the individual occpations. The central areas HPEMP's recommendations concern include: the team concept, credentialling, recruitment, retention, and mobility, continuing education, regionalization, institutional sharing of resources, health facilities (clinical) resources, faculty preparation and development and health sciences research. Specific recommendations for each of these areas, as well as those concerning manpower needs by occupation can be found in the HPEMP.

When it was developed, the Master Plan was envisioned as a "rolling" plan which would be refined and revised on a periodic basis. Since its approval in 1973, updated changes in its health manpower projections based on new data have been made for several professions. Furthermore, the Health Professions Education Advisory Council's Planning Committee has worked to revise the policy recommendations contained in the original document. Their recommended changes and priorities are currently under review by the Department. It is anticipated that a refined series of projections and recommendations will be disseminated by the end of the year.

Organization of the Health Professions Education Advisory Council

In 1972, while the Department was developing the Master Plan, the Board of Higher Education approved the establishment of the Health Professions Education Advisory Council (HPEAC) "to advise the Chancellor and the Board of Higher Education on planning, curriculum, coordination, and program evaluation in this field". HPEAC includes representation from all sectors of New Jersey's higher education network, the state health planning agency, consumers, providers, and professional societies. There are two standing committees of HPEAC, the Planning and Program Committees. Only one, the Planning Committee, currently has subcommittees (see

Figure 1, page 8 for organizational schematic of HPEAC.

The Planning Committee has major responsibility for updating the Health Professions Education Master Plan. Membership on this committee reflects the general representation of the parent body. The substructure of the Planning Committee is currently comprised of four subcommittees, one each concerning nursing, mental health, public health and health manpower. In the past, other subcommittees have confronted special issues for the Planning Committee in such areas as physical therapy and respiratory therapy. New subcommittees may be convened in the future as issues arise. The current subcommittees are described below:

1. The Nursing Subcommittee was organized early in the development of HPEAC. Charged with recommending specific guidelines, standards, and programs for nursing education in New Jersey, this subcommittee includes representation from the New Jersey Board of Nursing, the New Jersey Society for Nursing Service Administrators, the New Jersey League for Nursing, The New Jersey State Nurses Association, and practitioners and educators. Among the study groups which the subcommittee has created are a masters degree level group, a continuing education group, and educational flexibility and mobility group, and an inter-disciplinary group to analyze the relationship of evolving nursing care service delivery modes to professional nursing education programs.

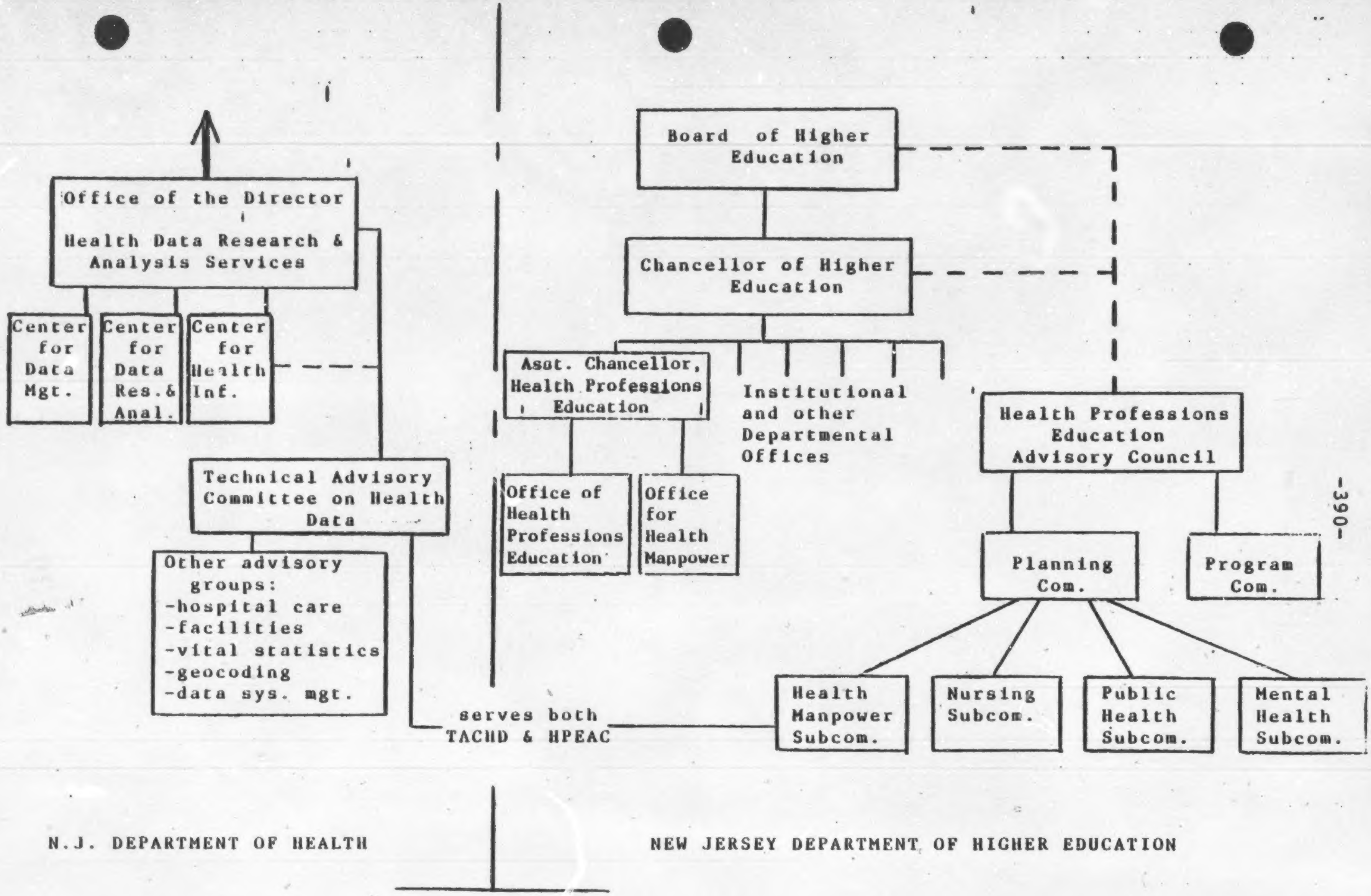
Office of the Director
Health Data Research & Analysis Services
Center for Data Mgt.
Center for Data Res.& Anal.
Center for Health Inf.
Technical Advisory Committee on Health Data
Other advisory groups:
-hospital care
-facilities
-vital statistics
-geocoding
-data sys. mgt.
serves both TACHD & HPEAC
Board of Higher Education
Chancellor of Higher Education
Asst. Chancellor, Health Professions Education
Institutional and other Departmental Offices
Office of Health Professions Education
Office for Health Manpower
Health Professions Education Advisory Council
Planning Com.
Program Com.
Health Manpower Subcom.
Nursing Subcom.
Public Health Subcom.
Mental Health Subcom.
N.J. DEPARTMENT OF HEALTH
NEW JERSEY DEPARTMENT OF HIGHER EDUCATION

Figure 1 - Organizational Chart of Health Manpower Advisory Network

2. The Mental Health Subcommittee is charged with examining present educational offerings and advising on changes needed to meet the needs of a reorganized system of mental health care delivery in the State. Current membership includes representation from academic institutions and the state agency and professional associations involved in mental health.
3. The recently created Public Health Subcommittee is to develop guidelines for masters level education in the area of public health. A broad range of membership exists on this subcommittee involving representatives from colleges and universities and practitioners in the various areas of public health.
4. The Health Manpower Subcommittee was established from an earlier advisory body, the Interagency Advisory Committee of Health Manpower. That committee was organized to provide advice to the Department in its development of the 1974 Uniform Survey of health professionals and to provide commentary on the creation of a federally funded health manpower information system. With the successful completion of the two-year federal health manpower linkage project, the Interagency Advisory Committee was shifted to the Department of Health's Health Data Research and Analysis Services where it was reconstituted as the Technical Advisory Committee on Health Data (TACHD). TACHD advises on the development of the State's Cooperative Health Statistics System. With this relocation of the Department of Higher Education's manpower advisory

group, the Department created the Health Manpower Subcommittee to provide advice on the health manpower projection methodology (to determine the future manpower supply and demands in New Jersey) and to analyze the results of manpower studies completed by the Department. This subcommittee serves a dual role, also advising TACHD.

HPEAC's other standing committee, the Program Committee, has responsibility for coordinating the review of newly proposed educational programs in the health professions. This review, which is mandatory for all public institutions of higher education and most private colleges, occurs whenever these institutions propose new programs. Further explanation of the review process is made in the following section. The Program Committee currently has representation from the collegiate sector, the New Jersey Hospital Association, and consumer representation from HSA V. Further description of past organization and summary of actions of HPEAC and its substructure can be found in the Appendix I of this report.

The Program Review Process

As previously noted, all New Jersey's public colleges, the State University, and most private colleges are required to submit new program plans to the Department for Board of Higher Education approval before such programs can begin to enroll students. In the area of health professions, such review and approval is controlled under two forms of documentation, the Preliminary Program Announcement and the Program Approval Document.

The Preliminary Program Announcement (PPA) is the first official communication from a college to the Department stating an intent to develop a new program. The PPA must be submitted over a year prior to the planned implementation of the program. Among the items which the PPA specifies are: name of program and degree to be granted, objectives of the program offering, general need for the program, anticipated program enrollment, date to be offered, program cost and resources to support this cost, regional manpower need, and conformity with the Health Professions Education Master Plan. Upon receipt of the PPA, it is sent to every other collegiate institution in the State for their commentary. In the past, the PPA was also sent to each of the four Comprehensive Health Planning agencies for commentary. This submittal to the CHPs was intended for their general information and to elicit their comments as to the relationship of the intended program's graduate output to local health manpower needs for the concerned health profession. Furthermore, consideration as to the appropriateness of any intended clinical arrangement by the new program with a local health facility was usually included in the agency's response. With the evolution of the Health Systems Agencies, the Department will be referring these PPA's to each of the five HSAs for local agency response. The turnaround time for the entire processing of PPAs is limited. Immediately upon receipt of a PPA, the Department sends out requests for commentary throughout the State. Responses are expected to be returned to the Department within a period of one or two weeks. All such responses to the PPA are then analyzed and sent to the submitting institution along with an advisory recommendation from the Department concerning the proposed program. The submitting college uses this input to decide whether or not to continue the program development process.

If a submitting institution decides to continue the program development process, it develops detailed program documentation for submittal to the Department and Board of Higher Education for final program approval. This documentation, known as the Program Approval Document (PAD), must be submitted to the Department no later than nine months prior to the anticipated program start-up date. The PAD details the entire program design from enrollment size and anticipated graduate output to course curriculum design and faculty appointments. Upon receipt of the PAD, it is referred to the Program Committee which reviews the documentation and makes comments and recommendations. These are relayed to outside consultants, chosen by the Department, in cooperation with the submitting institution, who are responsible for a site visit and evaluation of the proposed program design. The consultants' report is transmitted to the Program Committee which makes its recommendation to the Board of Higher Education. The Department takes the HPEAC recommendation and refers it to the Board along with its own recommendation for the proposed program. The Board will then either approve or disapprove the program as proposed and designed by the college.

Recently, the Board of Higher Education has moved to carry its program coordination activities to the area of existing programs. The Health Professions Education Master Plan has projected that by 1985, New Jersey would be faced with a surplus of professional nurses. Nevertheless, existing nursing programs began to increase enrollments at substantial rates. So great were these increases that nursing program outputs were bringing New Jersey to the surplus situation faster than first anticipated. In order to diminish the severity of the impending surplus, the Department recommended that limits be placed on enrollments at current levels. The proposal and its supporting analysis received much response, both positive and negative from HPEAC, its manpower and nursing subcommittees, and several constituencies. Recently, the Board decided to accept the recommendations for enrollment caps for a period of three years, premised on annual manpower reports from staff. It is conceivable that in other similar program growth situations, the Board may choose again to exercise its prerogatives for coordination of existing programs.

Organization of the Office of Health Professions Education and Office for Health Manpower

The Offices of Health Professions Education (OHPE) and Health Manpower (OHM) are responsible for health and health manpower related matters within the Department of Higher Education. Organizationally, both these offices report directly to Mr. Edward Cohen, the Assistant Chancellor for Health Professions Education. Staff in each office and their general responsibilities are detailed in Figure 2 on the following page.

It is appropriate to further explain some of the ongoing activities of OHPE and OHM. First, both these offices have been closely involved in the evolution of a tuition policy for medical and dental students. Recently, tuition levels for these students

FIGURE 2

Organization of OHPE and OHM

			Position	Name	General Responsibilities
ASSISTANT CHANCELLOR	OF HEALTH PROFESSIONS EDUCATION	Office of Health Professions Education (609)292-7170 7171	Associate Director	Priscilla Woolley	1. Coordination of Planning and Program Review Activities with in the Health Professions 2. Staff to HPEAC, the Planning and Review Committees and subcommittees.
			Assistant Director	Mary Keegan	1. Coordination of budgetary and faculty activities of the College of Medicine and Dentistry of New Jersey and its clinical affiliates. Development of medical and dental loan redemption program.
			Program Officer	Patricia Firth	1. Coordination of Department activities involving veterinary medical education and nursing. 2. Staff assistance to HPEAC and its committees and subcommittees and to the Veterinary Medicine Advisory Committee.
		Office for Health Manpower (609)292-8052	Director	Lew Dars	1. Coordination of all health manpower forecasting activities, loan redemption activities, Graduate Medical Education Council activities. 2. Chairman of the Health Manpower Subcommittee.
			Assistant Director	Jon Tomson	1. Coordination of health manpower data collection activities and federal contract responsibilities. 2. Staff to Manpower Subcommittee and Eye and Vision Care Committee.
			Program Officer	Patti Vasilenko	1. Coordination of graduate follow-up survey, loan redemption, and cancer control activities. 2. Staff to Manpower Subcommittee.

were raised by the CMDNJ Trustees to $4,000 for new in-state medical and dental students. In the future, tuition charges will be indexed to changes in the per student net education costs of these programs. These net educational costs at present are estimated at $17,000 for medicine and $21,800 for dentistry.

Staff has also worked to develop a loan forgiveness program for medical and dental graduates. Such a program will enable students to redeem a large portion (85%) of their loan principal in return for service in an underserved area designated by the State. It is anticipated that through this program, current patterns of medical and dental maldistribution can be significantly altered. Legislation creating this program has been proposed in both houses of the Legislature as S-1543 (in the Senate Education Committee) and A-2032 (passed committee - pending in Assembly). An important element of this legislation will be the designation of medical and dental manpower shortage areas by the Department of Health with inputs from the Technical Advisory Committee on Health Data. We feel that this process is an important one for HSA coordination. Accordingly, the Departments of Health and Higher Education, through their manpower advisory group, are beginning to develop a method to determine local health manpower scarcity areas. HSA involvement has been and will continue to be an integral element of this development stage. In this way, we hope to develop a unified methodology which pays appropriate attention to each area's special concerns and needs.

A third area with which the OHM has been closely involved for some time is graduate medical education. Graduate medical education

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is that educational activity following the award of a MD or DO, in other words, internship and residency training. For a period of over two years, a group designated as the Council on Graduate Medical Education has been meeting unofficially in New Jersey to discuss issues relating to the quality, distribution, and types of residency programs offered in the State. Currently, well over half our residencies are held by Foreign Medical Graduates (FMG's) and few programs are offered in primary care. The Council is seeking to be recognized as a statutory body under the aegis of the Department and Board of Higher Education. It would recommend strategies for coordinating and funding residency programs in needed specialties and geographic areas. To this end, Senate Bill S-1387 has been proposed to enable the creation and start-up funding of a Council on Graduate Medical Education. HSA involvement with the various activities of the Council will be affirmed through agency involvement on one or more of subcommittees of the Council, which include Finance, Manpower, Operations and Recruitment.

The Office for Health Manpower is also completing the first year of a two year DHEW funded health manpower contract. This is the second such contract which the Department has received from DHEW. During the First contract, OHM created a statewide health manpower information system and disseminated a series of health manpower data reports which provided data on physicians, dentists and hygienists, nurses, selected non-licensed health professionals, and inventories of health professions education programs and clinical training sites (see Table 1 on the following page for a listing of these publications). The Department's current contract requirements include the detailing of a data collection methodology for

Table 1 - List of OHPE/OHM Publications

Title	Date
Health Professions Education Master Plan (287 pp.)	May 1973
Monograph I - "An Analysis of the Concepts of Demand and Need for Medical Care and their Implications for Manpower Planning" (21 pp.)	June 1973
Monograph II - "Development of Uniform Data Base for State and Local Health Manpower Planning" (100 pp.)	August 1974
Health Manpower Information Series (HMIS): Volume 1, Number 1: "N. J. Licensed Physicians" (100 pp.)	January 1975
HMIS Volume 1, Number 2: "N. J. Licensed Dentists and Dental Hygienists" (58 pp.)	April 1975
HMIS Volume 1, Number 3: "N. J. Licensed Professional Nurses" (41 pp.)	June 1975
HMIS Volume 1, Number 4: "An Inventory of Health Professions Education Programs in N. J." (87 pp.)	October 1975
HMIS Volume 1, Number 5: "Employment of Non Licensed Health Professionals in N. J." (52 pp.)	December 1975
"Final Comprehensive Report" DHEW Contract NO1-MB-44001 (66 pp. plus appendices)	
HMIS Volume 1, Number 6: "An Inventory of Clinical Resources Used by Health Professions Education Programs in N. J." (141 pp.)	July 1976
HMIS Volume 1, Number 7: "New Jersey Health Manpower Information System Users Manual" (46 pp.)	August 1976

non-licensed health professions; the development of a model for the tracking of health professions program graduates both geographically and occupationally; the completion of a series of health manpower projections, and coordination of our ongoing planning activities with those of the HSAs and the State Agency. This introductory paper is one manner in which we hope to affect such coordination.

As previously mentioned, manpower reports were developed from data collected and processed by the Department of Higher Education in 1974. The Department has developed software for this data base; a users manual for this software can be found in the Appendix II. More recent manpower data can be obtained from the Department of health professions education programs and clinical training sites in New Jersey. Both these inventories, Numbers 4 and 6 of Volume 1 of the Health Manpower Information Series are included with this report (Appendix III). An updated version of this inventory of programs will be developed for publication by October 1977. The clinical resources inventory will be integrated with planned Department of Health surveys. Finally, an integral element of our master planning process has been the creation of statewide forecasts of future supply of and demand for several health professions. These include physicians, dentists, veterinarians, nurses, dental hygienists, dental laboratory techicians and assistants, pharmacists, medical technologists and laboratory technicians, radiologic technicians, dietitians, physical therapists, and several other allied health professions. All these projections are in the process of being updated. Upon their completion, the results of our analysis will be sent to each HSA.

Local Agency Functions in the Health Manpower Planning Process

The role of the local health planning agency in the health professions planning process was first specified by a special HPEAC study group in 1973. We believe that each agency should define for itself what such planning functions should be. As we have given this matter much thought, we would like to suggest that you consider the following as potential central areas to a health professions education planning capacity:

1. Identification of local health manpower needs and surpluses and the communication of such findings to relevant state agencies and local educational institutions. This includes the development of shortage area designation applications.
2. Verification of appropriateness of clinical facilities to be used by educational institutions in health professions programs.
3. Identification of local needs for in-service and related continuing education or training programs.

Once your agency has determined its priority with regard to health manpower planning and the above functions, we would like to suggest two alternatives to effectively achieve whatever health manpower planning objectives you have selected. The first option would be to relegate health manpower planning responsibilities solely to staff which would initiate relevant planning activities and respond to outside inquiries concerning manpower. This choice would be the most efficient means for an agency to respond to manpower planning responsibilities. It might also, however, be less effective than the second option, as it could foster somewhat narrow plans due to lack of input from those agencies and people in the local area that are active in the health professions area, including educators, practitioners, and employers. The second option would be to involve a group of these people either formally or informally in the local health manpower planning process. This could be accomplished by utilizing an existing advisory committee with this kind of representation; forming either a standing or ad hoc working subcommittee of an existing committee; or creating a working advisory committee charged with the responsibility for health manpower. If the agency chooses this second option to affirm outside advice in the manpower area, it should carefully select representation from appropriate constituencies. On the broadest scale, these might include representation from secondary education institutions, CETA programs, vocational technical schools, two and four year colleges, health care provider institutions (especially those which offer in-service training), health care professionals and practitioners, consumers and community respresentation. The choice of scale and method of involvement rests with your agency. It is hoped that you do not underestimate the importance of creating a health manpower planning capacity and that each agency can determine an appropriate level of involvement in this area to complement other planning functions.

Conclusion

In concluding this paper, we would like to review the mechanism now in place to coordinate the local agency with the Department of Higher Education's planning process.

Starting immediately, your agency will be sent copies all Preliminary Program Announcements (PPAs) submitted to the Department by colleges proposing health professions education programs. Comments of the agency or its manpower committee or both may be provided. These should be concerned with the perceived local need for the program and its graduates and the appropriateness of the clinical affiliation proposed, if any. Such commentary should also weigh the proposed program as to its conformity to any local or regional plans. Your rsponse will be studied by the Department and it will be sent to the collegiate institution which submitted the PPA.

The other mechanism for your involvement in our planning process is through representation on the Department's advisory bodies. First, each agency will continue to appoint a community representative to serve on HPEAC or its standing committees. The onus for HSA staff coordination and apprisal of HPEAC actions is with the agency and its chosen representative. Upon request we can also send the agency copies of HPEAC minutes. A second level of input is concerned solely with HSA staff. This is provided by agency representation on the manpower subcommittee which serves both HPEAC's Planning Committee and the Department of Health's Technical Advisory Committee on Health Data. In the coming months, we expect the manpower group to be involved with the review of planned manpower data collection and reporting activities at DH, the development of a method for determination of local health manpower shortage areas, and the review of DHE's new series of health manpower projections. Your agency's involvement in these activities will be beneficial to us and, we expect, helpful to you. If you have any questions on this paper or on any other matter related to health manpower and health professions education, you should feel free to call any of the staff of the Offices of Health Professions Education and Health Manpower. Also, Jon Tomson will serve as liaison to your agency; he can be reached at (609) 292-8052.